

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off.
Established 1902

Vol. 62

No. 16

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Automotive Industries is published every Saturday by
CHILTON CLASS JOURNAL COMPANY

Chestnut and 56th Streets, Philadelphia, Pa.

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Controlled by United Business Publishers, Inc., 239 West 39th St., New York;
ANDREW C. PEARSON, Chairman, Board of Directors; FRITZ J. FRANK, President;
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SUBSCRIPTION RATES: United States, Mexico, United States Possessions, Canada and all countries in Postal Union, \$3.00 per year; Foreign, \$6.00 per year. Single Copies 35c.

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Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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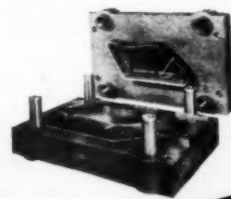


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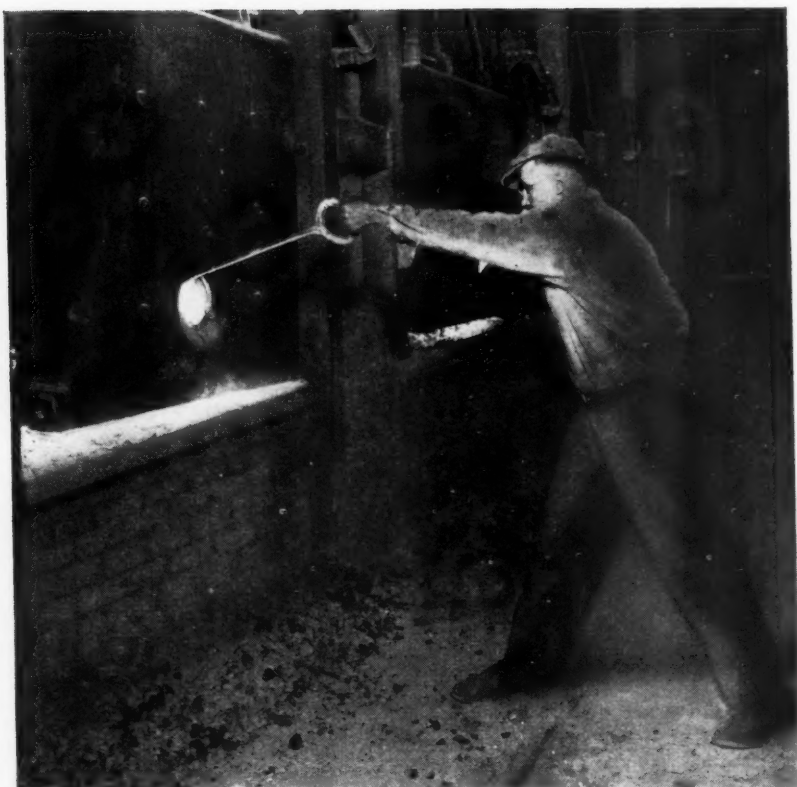
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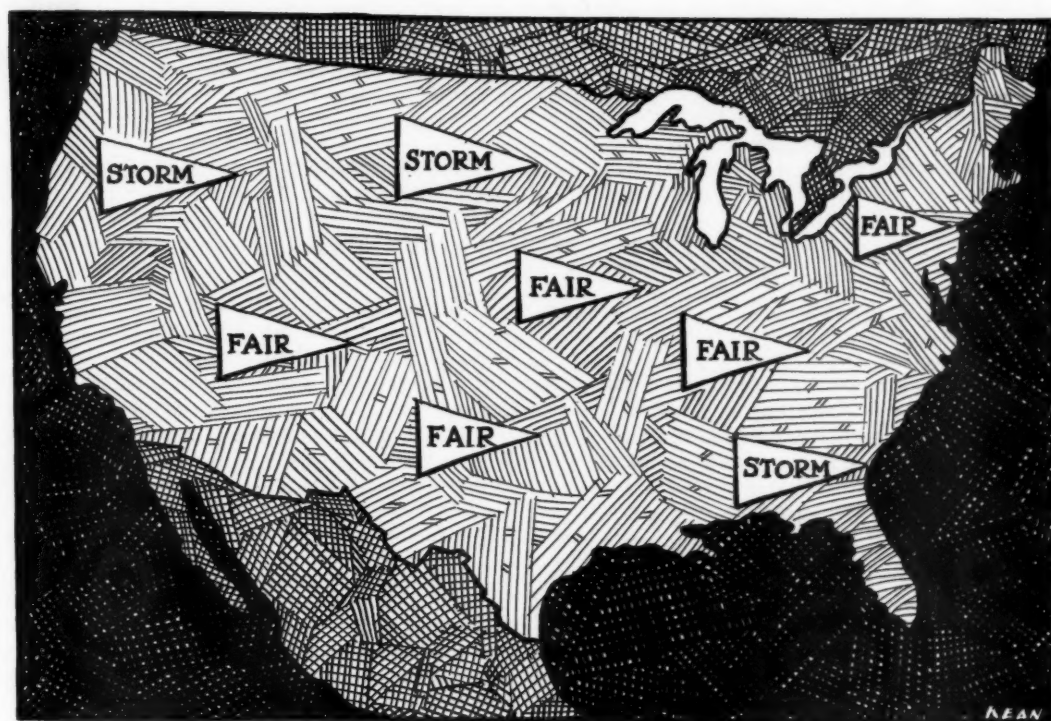
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AUTOMOTIVE INDUSTRIES

VOLUME 62

APRIL 19, 1930

NUMBER 16



Weather throughout the country is expected to be generally fair next week

WEATHER POINTS TO BETTER SALES

WEATHER signals throughout the country are being watched more carefully than usual this year by automobile factory executives. Just now, after the bad weather generally in the Northwest, Western and some of the Middle Western States, orders for automobiles are increasing.

Twelve sales executives, most of whom have just returned from trips into the larger market areas of the country, are sure that another week of real spring weather will give the second quarter an impetus which will be felt during the remainder of the year. Texans are more cheerful than they were a week ago, as they are fairly certain to have a good year there agriculturally. New England has reacted sharply to the psychology of better business reports throughout the rest of the country, in spite of foul weather in several sections of the northeastern seaboard.

The industrial centers of the Eastern and Central States are showing some improvement and seem to be reacting more spontaneously than usual toward

Industrial centers react favorably to spring tonic and factory executives expect new impetus to business in second quarter of the year

By Leslie Peat

fine weather. Cars in the low-priced bracket are, as a group, showing increased sales for the first months of this year as compared with 1929. Ford, followed by Chevrolet, leads. Both the medium and high-priced groups have shown sharp recessions in retail volume as compared with the first part of last year.

It is pretty generally agreed by sales managers that many normal new car prospects in the higher-priced fields are waiting to be sold new cars. When an industry has been kept busy for two years supplying a ready-made demand, it is hardly reasonable that sales organizations can be immediately geared down to the job of selling against resistance caused by the slump of the last few months of last year. So, as we get well into the second quarter, we find that a good deal of demand must be created for those who are just about, but not quite, willing to buy new automobiles, to overcome the feeling on a part of the public that automobiles may be had if one is willing to wait for deliveries.

It is not hard to see that sales executives are

looking back at the past half-year more philosophically than when, during the days of the New York and Chicago automobile shows, they contemplated last fall's slump. Then, inherent sales enthusiasm, a type of optimism peculiar to those who sell things, failed to rally and left them somewhat depressed when sales actually failed to recuperate. Now, they see that dealers have been given a demonstration on how *not* to trade good automobiles for bad ones; they have had time to look things over carefully and plan their 1930 campaigns.

It is not hard to recall the days when, with few exceptions, low-priced cars were something of a hazard. Now, with the mechanical development of two decades behind, all automobiles in the industry offer a great deal for the money invested, and the low-priced cars are designed for eye appeal and comfort to a great degree. Therefore, sales heads at the medium-priced and expensive automobile factories are finding, simultaneously with a major industrial and financial depression, a new competition.

Another interesting thing—a sort of a post-mortem view—has been the lively interest taken since the first of the year in new automobile powerplants. Several announcements of importance soon will be made by manufacturers in regard to forthcoming new models. This sounds like the preparations for the first barrage of the year's selling campaign. Its lateness can probably be accounted for by the fact that the manufacturers have not been in very good offensive trim.

Good Showing This Month

Although retail-passenger car sales have been showing up surprisingly well for the first part of the second quarter as compared with the same period last year, the trend seems to follow the January and February lead established by the low-priced group. In the first two months of 1930, Ford gained 5 per cent and Chevrolet gained 15 per cent over the same period last year. The total for Essex, Plymouth, Pontiac, Whippet and Willys six shows a loss of 52 per cent for the two months, which brings the decrease for the entire low-priced group to about 6 per cent as compared with last year.

During the same two months, the medium-priced

field showed a loss of 32 per cent as compared with January and February of 1929. High-priced cars dropped about 15 per cent, according to the last available figures.

The sales trend in the low-priced field, which has been apparent since the Ford model A got into production, continued through the opening of the second quarter. This development seems to be one of the significant sales factors of 1930 and is being watched intently by sales executives of factories producing medium-priced automobiles.

Dealers Too Cautious

This business of gearing production down to dealer requirements is a source of considerable worry on the part of a good many automobile manufacturers. As we predicted some time ago, dealers have proved to have been too cautious in building up their stocks for the spring selling season, with the result that factories have been called upon to deliver a good many more rush orders than has been good for the industry.

Dealers, who have felt that they have been forced during the past year or two to take larger shipments of automobiles than they could dispose of economically, have exercised the human trait of going to the other extreme since the compulsion to buy has been removed. Figures on production costs under these circumstances, compared with production figures taken from a regime when production ran a more even course, will be one of the most interesting studies that 1930 will produce. It is natural that some factory executives feel that this method of determining schedules is not helping the present uneasy feeling of labor in industrial centers.

It seems probable that April production will reach 450,000 passenger cars and trucks, as compared with about 400,000 in March.

The export situation is gloomy. Exports have suffered sharp declines as compared with last year. This adds to the eagerness for domestic business, of course, and will be something of a new experience for some automobile makers. During the national automobile shows, several sales managers expressed the opinion that 1930 exports of passenger cars would be

(Continued on page 616)

How the Retail Sales Horizon Appears for the Second Quarter

Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. Weather prospects are good. Factory orders have increased.

New York, New Jersey and Pennsylvania. Sales should compare favorably with first quarter of 1930.

Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Florida and West Virginia. Industrial depression continues.

Ohio, Indiana, Illinois, Michigan and Wisconsin. Employment is off, but business is generally picking up.

Minnesota, Missouri, Iowa, North Dakota, South Dakota, Nebraska and Kansas. Sales show few signs of recuperating from low first quarter level.

Kentucky, Tennessee, Alabama and Mississippi.

Sales prospects good in smaller towns. Agricultural outlook generally favorable.

Arkansas, Louisiana, Oklahoma and Texas.

Tobacco and cotton outlook good. Some gain over first quarter is expected.

Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah and Nevada.

Sales will be about level with first quarter.

Washington, Oregon and California.

Sales good despite rains. Rainy season about over and outlook is bright.

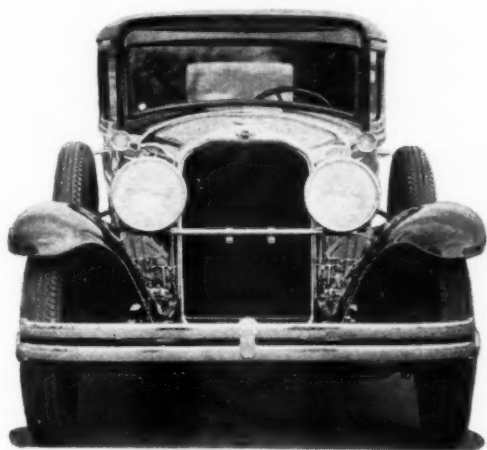
Willys-Overland Offers Eight at \$1,245 to \$1,395

Chassis and design are patterned on the six-cylinder car announced in January. Rubber in compression used for engine mounting, closely approaching the solid type.

OFFICIAL announcement is made by Willys-Overland of its entry into the eight-cylinder field with the introduction of the Willys eight, at prices ranging from \$1,245 to \$1,395. For the time being two basic body models will be offered on this senior companion car to the Willys six, introduced in January. Prices are as follows:

Standard Coupe . . \$1,245	De luxe Coupe . . . \$1,345
Standard Sedan . . \$1,295	De luxe Sedan . . . \$1,395

De luxe equipment includes six wire wheels with spares mounted in fender wells. The coupe is of the four-passenger variety with folding auxiliary seat.

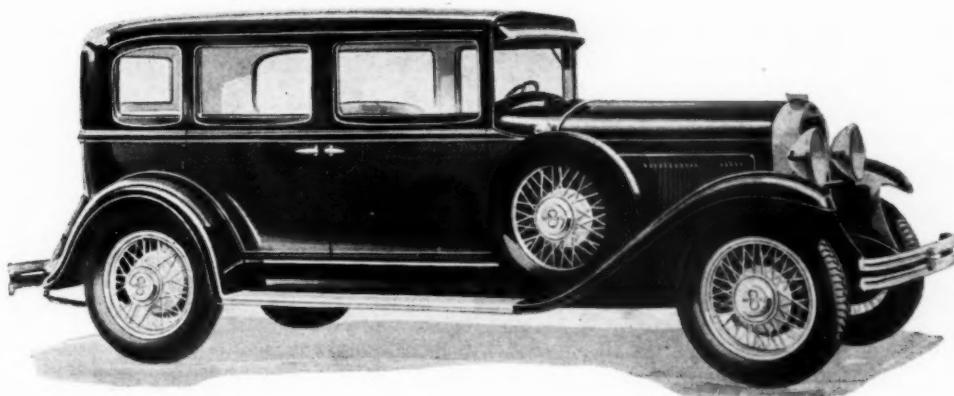


Front view of the new Willys eight, companion car to the Willys six, showing the new radiator outline, cow lamps, and gradual taper from the center of the body forward

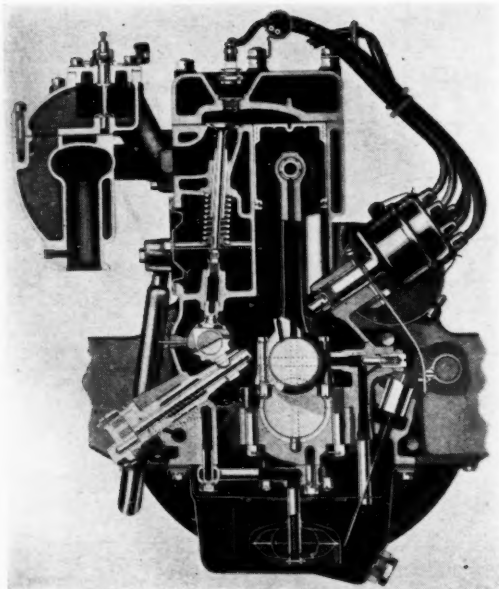
Outstanding in the Willy's eight's characteristics, as viewed by the writer, is its performance. Top speed is in the neighborhood of 75 m.p.h. and the speedometer will show over 50 in second gear. Acceleration is also good. The high standards of performance incorporated in the new car are due to a combination of light weight, in spite of the 120-in. wheelbase, low head resistance, due to low overall height, a standard gear ratio of 4.4 to 1 and an engine designed by Willys-Overland and built by Continental, developing 80 hp. at 3200 r.p.m. and 170 lb.-ft. torque at 1200 r.p.m.

Basically there is nothing radical in the new Willys eight. Chassis units and design are patterned after the Willys six, strengthened and increased in size, etc., as demanded by the higher loads. The engine is of the conventional straight eight L-head type with a bore and stroke of $3\frac{1}{8}$ by 4 in. and a displacement of 245.4 cu. in.

In the four-point engine mounting reversion to rubber in compression is to be noted. According to A. J. Baker, chief engineer of Willys-Overland, rubber in compression has been found more desirable than rubber in tension from a point of view of reducing clutch chatter. At the front supports the load is taken vertically on the front cross member with rubber disks and specially designed washers and cups to provide the necessary characteristics. At the rear the mounting represents a close approach to the solid type mounting. The rear supports are secured to the bell housing and to the frame side rail, with rubber be-

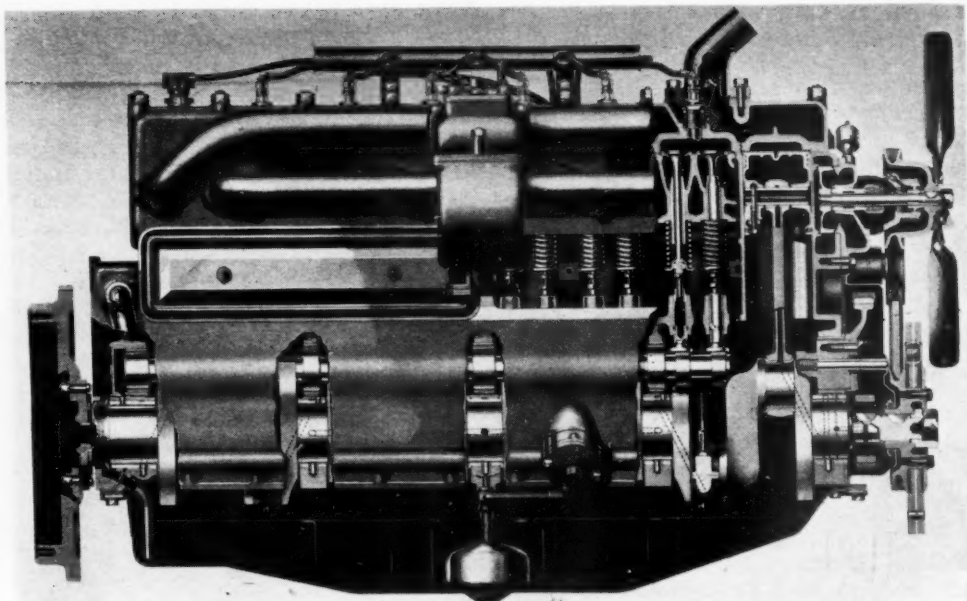


De luxe edition of the Willys eight five-passenger sedan on a 120 in. wheelbase listing at \$1,395



Transverse section of the Willys eight engine (above) showing the inclined valves for compactness and ample guide length, inclined accessories shaft, water jacket ribbing over the combustion chamber, manual manifold heat control, and oil ring at the bottom of the piston skirt.

Longitudinal section of the Willys-Overland-designed, Continental-built eight-cylinder engine. Note the counterweighted crankshaft, ribbed piston head, rifle drilled rods, Lanchester damper.



tween the support leg and the side rail lower flange, as well as between the support leg and the web of the side rail. An outer plate to which is bonded a second sheet of rubber serves to insulate the bolts completely from the side rail. In addition to the four-corner bolts customarily used with the plate type mounting, a center bolt is provided which has been found desirable in order to properly control the amount of initial compression on the rubber during assembly.

Other features of the engine include rifle-drilled connecting rods, a 5.4 to 1 compression ratio, four-ring, cast-iron pistons with the oil control ring at the bottom of the skirt, ribbing in the water jacket over the combustion chamber, as well as under the piston head, a counterbalanced crankshaft with integral counterweights and five main bearings, a Lanchester damper integral with the fan pulley and bushed camshaft bearings. Front-end drive is by a two-point $1\frac{1}{4}$ in. chain similar to that on the six. The accessories shaft is of the inclined type with the oil pump at the lower

end, providing full pressure lubrication to all bearings. The distributor at the upper end of the inclined shaft is of the semi-automatic type with two breakers and a single coil, the latter containing the ignition lock, for which reason it is mounted in back of the instrument board. Finger-tip control used on other Willys-Overland cars is also found on the Willys eight.

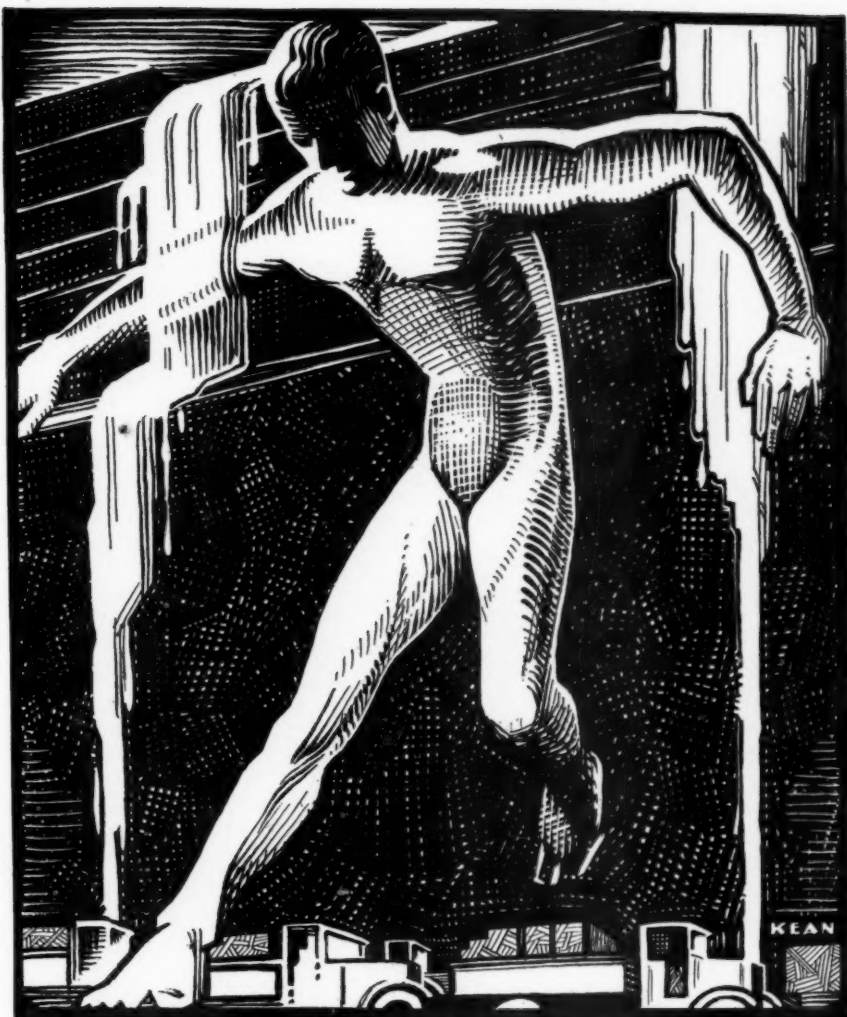
The clutch is of the single-plate type. It has a rubber insert between the driven plate and the clutch hub to cushion the plate. The transmission is quite similar to that of the Willys six and the gear shift lever is mounted on the bell housing to provide more front compartment room. Inclined mounting of the unit powerplant in the chassis permits a straight drive and minimum angular motion at the bearings of the universal joints. Rear axles are semi-floating with banjo housings and Timken bearings throughout. In addition to the standard ratio of 4.4 to 1, an optional ratio for mountainous country of 4.89 to 1 is available. The low overall height of the Willys eight at the rear is largely due to a clearance space recessed in the rear seat pan and seat cushion at

the center, for the differential housing.

Front axles are of the reverse Elliott type with Timken roller bearings in both wheels and for steering knuckle thrust. The steering gear is a Ross cam and lever straight-ratio (15 to 1) type with adjustable column and three spoke, 17-in. wheel. Frames are double drop pressed steel with tubular front and rear cross members, a "Z" type cross member at the rear kick-up and channel members elsewhere. Semi-elliptic springs are of chrome-vanadium steel and mounted in Tryon shackles. Spring control is by means of Monroe hydraulics front and rear. As already mentioned, wire wheels are provided on the de luxe models, while 12-spoke artillery wheels are standard on the Standard Sedan and Coupe. Both carry a 5.50/19 tire.

Brakes, as on the Willys six, are of the Bendix Duo-Servo two-shoe type, with 12 in. drums and single cross shaft to which are connected both pedal and hand controls, the emergency being mounted to the left of the driver on the frame side channel.

Educational drive, coordinating effort of motor vehicle freight carriers, is undertaken by the N. A. C. C. in an effort to—



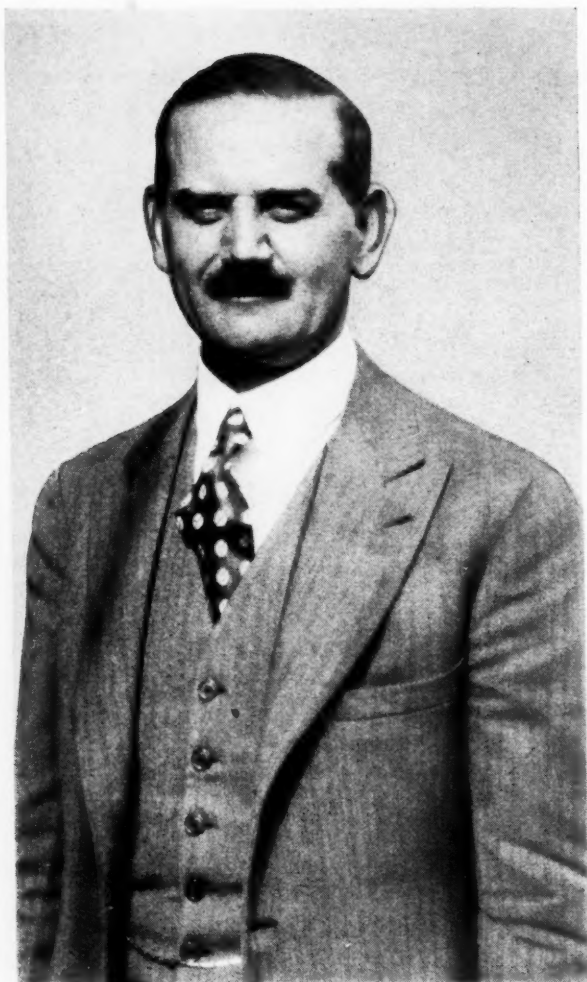
STEM TIDE OF TRUCK LEGISLATION

THE motor truck continues to thrive, and, right at present, from a standpoint of production, is in a relatively better position than the automobile. Getting its real start only after the war, when the automobile was soundly established, the motor truck has been largely adopted as an adjunct of all forms of business and in the last few years the proportion of motor trucks to automobiles has been steadily increasing. Moreover, this increasing growth of truck use has come about in spite of a good deal of uncertainty as to its economic sphere of usefulness; its place in the transportation field in relation to other agencies, and a great deal of misunderstanding in the public mind about its value, which has resulted in unduly restrictive regulation and severe taxation.

Perplexities which puzzle the public mind are shared to a large degree by those more closely connected with and affected by the truck industry—the truck owner, the truck manufacturer and dealer, legislators, motor vehicle and highway administrators, railroad executives and others.

■ In the absence of a strong national truck owner organization, more study has been given to these complex problems by the manufacturers, through the National Automobile Chamber of Commerce, than by any other group. The chamber has coped with some of the more important problems about which its studies indicated a clear path could be followed, and its work in connection with coordinated transportation, regulation of common carrier vehicles and the investigation of trucks and buses by the Interstate Commerce Commission, has been highly beneficial not only to the manufacturers but to truck owners, shippers and other transportation agencies, and the public in general. Of great value also have been the principles respecting fair legislation affecting commercial motor vehicles and digests of the state laws prepared and issued by the Motor Vehicle Conference Committee.

Notwithstanding this measure of useful work, the facts are that many of the problems in the truck industry have been so intricate and so difficult to deal with that no one has tried to handle them. Now, however,



Alfred Reeves, general manager, National Automobile Chamber of Commerce, who will supervise the motor truck educational campaign recently undertaken by the chamber

we have, in the recent announcement of the expansion of the Motor Truck Department of the National Automobile Chamber of Commerce, and the inauguration of a nation-wide motor truck educational campaign on a five years' basis, a definite and well-organized effort to analyze the evils and inconsistencies of the industry and some definite suggestions for handling some of the problems.

Perhaps the basis of most of the difficulties in the truck industry may be found in the way it has developed. It has much in common with other transportation agencies, but it is radically different from every one of them. It simply is "neither flesh, nor fowl, nor good red herring."

Railroads and trolley lines have consolidated into immense corporations, holding themselves out to serve every one who comes to them. The automobile is the private transportation agency of its owner, entirely under his control. The truck is both of these and something else beside. Eighty-two per cent of the trucks are privately owned; 7 per cent are owned by those who serve the public; and 11 per cent serve the public under contract—but only a limited part of the public, which they reserve the right to select.

Establish these cross sections of truck use in your mind and you then find it necessary to cleave through

each section with another sharply important factor. Over 2,200,000 of our 3,370,000 trucks are owned by as many individual owners. The remaining 1,170,000 trucks are owned by some 300,000 different owners, or an average fleet ownership of less than four trucks for the country. The use of trucks then resolves itself into many minute enterprises, the largest of which is smaller in size and importance than the average short-line railroad. But the entire 3,370,000 give a daily transportation service over 3,000,000 miles of highways in the country, providing a type of personally directed and controlled freight transportation service impossible to obtain through any other agency.

America has always prided itself as a country of unlimited opportunity in competition in business enterprise and it is doubtful whether any industry provides as free play for open competition as does the truck. Those trucks which serve the general public as common carriers are subject to competition in rates and service by the contract hauler and both the common carrier and contract hauler are always aware that if their service is not highly satisfactory or their rates fair, shippers can always purchase their own trucks and haul their own goods.

Born of a feeling by the railroads that this truck industry has deprived them of a great deal of freight revenue, and of the feeling by some of those engaged in the truck business that they would like protection from competition, has come a considerable degree of demand for regulation of the business of operating trucks for hire that would result, from the railroad point of view, in curtailment of truck use, and from the truckers' point of view, in monopoly. In response to this demand some 35 states have laws upon their statute books providing for regulation of the truck business in greater or less degree. From such a parentage not much should be expected of these laws, and certainly they have not yet amounted to much. One common characteristic of all 35 laws has been the imposition of special fees for common carriers amounting from three to six times the fees paid by privately owned trucks of similar size.

Although a few groups of truck owners are manfully struggling with the problem of trying to modify their regulatory laws so that the truck business will flourish, there is the greatest possible confusion of mind as to the advantages of this type of law and as to how a good law should be drawn. This problem is one of the most important as well as the most difficult that the truck department of the N.A.C.C. is grappling with in its truck educational campaign. To analyze the laws now passed and the court



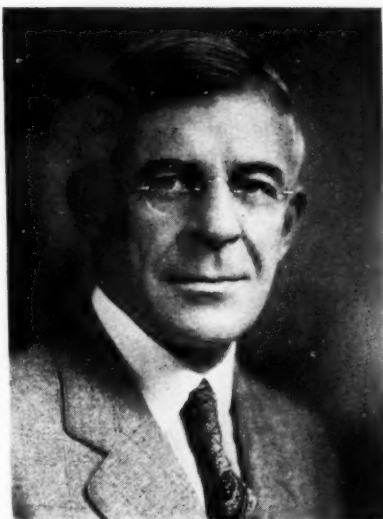
Harry R. Cobleigh, who is in charge of the chamber's program for better driving of trucks as well as the speakers' bureau

decisions affecting them and to study the possibilities in such legislation, the chamber has retained LaRue Brown of Boston, whose previous service for the bus industry in connection with the Parker bill for Federal bus regulation in 1928 and 1929 was so effective.

Illustrating the importance of the regulation problem, Oklahoma revised its law last year and obtained a measure which, if literally and fully enforced, will cost the shippers of the state millions of dollars, substantially reduce the number of trucks in use, and restore to the railroads a considerable volume of short-haul tonnage which can be more economically hauled by truck. As far as can be determined, three groups of truck owners each sought to restrict and tax truck use by the other groups, and each sought the aid of the principal railroads in the state in getting their plan adopted by the legislature. Each group is said to have received the desired support, and with some enthusiasm, and the result is a law satisfactory to none and hampering all, if enforced as written. Just recently the Corporation Commission of the state has begun active enforcement of at least part of the provisions.

A steady trend upward in truck taxes for a decade is fully complimentary to the regulation situation, and since the tax burden is more easily understood, is perhaps causing more distress. In half a dozen states the tax on larger trucks is over \$1,000 each and in about 15 states, it ranges from \$500 to \$1,000. In many cases these heavy fees apply to heavy trucks of such average size as 3 tons. Since the average automobile tax is under \$25 for registration fees and gas tax, it is hard to construe by any theory that there is any justice in taxing any truck over \$500 no matter what its size. The Truck Committee is giving its earnest attention to this problem and hopes to develop principles which it believes will more fairly gage the share of the truck in the raising of funds for highways.

Since no one desires heavy tax burdens, and states must raise money to pay their bills, those interests insufficiently organized to present their case frequently suffer. Although representatives of some 45 truck owners' associations have done



La Rue Brown, legal counsel for the truck department of the N. A. C. C.



Richard S. Armstrong, newly appointed secretary of the Motor Vehicle Conference Committee

a good deal of hard work in the past, they have been handicapped by lack of support. In no state is there a truck association which includes more than 2 per cent of the state's truck owners. Accordingly, if for no other reason than to stem the tide of rising truck taxes, larger and better state truck associations are desirable, and much of the work contemplated in the Truck Educational campaign is calculated to aid such organizations.

A speakers' bureau has already been established and it will be expanded to carry the facts about truck advantages to every section of the country. Special research projects are under way, as is an extensive supporting publicity campaign.

The motor truck educational campaign is being administered by the Motor Truck Committee of the Chamber, under the direction of Edward F. Loomis, secretary, and supervised by Alfred Reeves, general manager. The directors of the chamber have approved a special appropriation for the enlarged work.

Associated with Mr. Loomis in the new effort is Harry R. Cobleigh, for many years of the chamber's staff, whose full time is now devoted to truck matters. Mr. Cobleigh is assisting in the general program, and is also managing the better driving campaign and the speakers' bureau.

LaRue Brown is managing the legal department and will have a full-time assistant whose appointment is not yet announced. He will work closely with the Motor Vehicle Conference Committee, as well as the Truck Department.

Functions of the Motor Vehicle Conference Committee will be somewhat enlarged at the request of the Truck Committee to aid in certain phases of the educational campaign under the direction of Richard S. Armstrong, whose appointment as secretary of the conference was announced last week.

The Motor Truck Committee of the Chamber, which developed and sponsored the plans for the campaign, is now made up of the following members: A. J. Brosseau (Mack), chairman; M. L. Pulcher (Federal); W. F. McAfee (International Harvester); W. C. Parker, (Reo); R. G. Hayssen (Sterling); David C. Fenner (Mack); Howard E. Sneathen (Dodge Brothers); T. R. Dahl (White), and Paul W. Seiler (Yellow Truck & Coach).



Edward F. Loomis, secretary of the N. A. C. C., who will administer and act as executive of the organization's truck activities

Horsepowers of Engines Vary Less of Individual Cylinders

ONE of the questions that has long interested engineers concerned with the design of high-speed internal combustion engines, is the dependence of the maximum output on the displacement of the individual cylinder. Suppose we have an engine of, say, 2½ in. bore and 3 in. stroke, and we enlarge this design "photographically" so that all linear dimensions (except thicknesses of metal sections) are doubled, making the bore and stroke 5 by 6 in. What is likely to be the maximum output of the new engine in comparison with that of the smaller one, and how do the stresses and the bearing loads in the different parts compare at the respective maximum outputs?

The piston displacement of the larger engine is eight times as great, and if this engine could be run at the same speed and at the same volumetric efficiency, evidently eight times as much combustible charge would pass through it; then, if the compression could be carried to the same figure, so that the thermal efficiency were the same, the larger engine would develop eight times as much power as the smaller one. It is obvious, however, that the large engine cannot well be operated at the same speed of revolution as the smaller one. In the first place, the valve-port area is only four times as great, and for the same volumetric efficiency the charge would have to flow through the valve ports at exactly twice the velocity in the larger engine. Secondly, the projected areas of the various bearings are only four times as large and the inertia forces due to the reciprocating parts would be far more than four times as great. These inertia forces are directly proportional to the weights of the reciprocating parts and to the length of the stroke, aside from being proportional to the square of the number of revolutions per minute.

If the maximum gas speed through the valve port were the same in both cases, then the larger engine could be operated only at one-half the speed of rotation of the smaller one. However, gases meet with relatively less resistance when flowing through larger passages, and higher gas velocities may therefore be expected through the valves and inlet passages of the larger engine. In the case of steady flow, or what is sometimes referred to as streamline flow, through a pipe, the loss in head is the same if the velocity of the gas varies as the square root of the diameter. In other words, if we have pipes of the same length and maintain the same difference of pressure between the ends thereof, the velocities of flow in the different pipes will be in proportion to the

square roots of their respective diameters.

In the inlet passages of an internal combustion engine the conditions are rather different, however, for the flow is largely pulsating. Only a portion of the energy imparted to the column of gas flowing into the cylinder is used up in overcoming skin friction—which is the only source of loss in the case of steady streamline flow in a pipe—the rest being used to impart kinetic energy to the gas, which is later frittered away in turbulence. If the volumetric efficiency is the same in the two cases the same amount of energy is imparted to the incoming charge per square inch of cross section of the inlet passage in both cases, and if turbulence were the only cause of loss the gas velocity would be exactly the same in both engines.

Since the cross-sectional area of the inlet passage varies as the square of the linear dimension, in case skin friction were the only cause of loss in the inlet tract the gas velocity would vary as the square root of the linear dimensions, and the pumping capacity as the 2.5th power thereof. On the other hand, if turbulence were the only cause of loss the gas velocity would be independent of the linear dimension and the pumping capacity would vary as the square of the linear dimensions. In practice conditions are somewhere between these two extremes. In a multi-cylinder engine the flow through the carburetor, the inlet riser, the air intake to the carburetor and any devices ahead of the carburetor, such as an air cleaner, is more or less constant, and skin friction is the predominant factor. On the other hand, in the different branches of the manifold and in the valve passages the flow is intermittent and turbulence therefore is the chief cause of loss. The pumping capacity therefore will vary as some power of the linear dimensions intermediate between the second and the two-and-one-half. Probably in most cases turbulence is the most potent cause of loss, and we cannot be far wrong in assuming that the pumping capacity varies as the 2.2th power of the linear dimensions. Now, the displacement of the cylinder varies as d^3 , where d is any linear dimension, hence the speed of revolution at which the engine can be operated so far as pumping capacity is concerned varies as

$$d^{2.2}/d^3 = 1/d^{0.8}$$

If all dimensions of the engines were varied in strict proportion, then the weights of the reciprocating parts would vary as the cubes of the linear dimensions.

Why More Cylinders?

THE greater power required in modern cars can be obtained to better advantage from numerous small cylinders than from a small number of large cylinders, Mr. Heldt finds. This is accounted for by the fact that, although the larger displacement of the individual cylinder might be expected to give proportionately increased power, the compression ratio must be decreased and the speed reduced. But, if more cylinders are used, the compression and speed can at least remain constant, and the power then increases in direct proportion to the number of cylinders

Rapidly than Displacement

By P. M. HELDT

However, in practice the thicknesses of sections are not increased as fast as other linear dimensions. This is permissible because a certain allowance must be made for inaccuracies due to casting, which is more or less independent of size, and is highly desirable because the inertia forces tend to increase faster than the projected bearing areas, hence it is necessary in the larger engines to cut down the reciprocating weights by all possible means.

An analysis made by the writer some years ago on the basis of data on stock engines showed that piston weights vary substantially as the 2.34th power of the cylinder bore. This, of course, implies only a very slight thickening of sections with increase in the linear dimensions of the cylinder—about 25 per cent increase for a doubling of the linear dimensions of the cylinder. The proportion seems to be too small to make the rule safely applicable over a wide range of sizes, especially as regards the total of the reciprocating weight, for it appears that the connecting rod weight must be increased somewhat more rapidly than piston weight with the linear dimensions of the cylinder. A German manufacturer of light-metal pistons has issued charts showing piston weights to vary with cylinder bores as the 2.8th power of the latter. This appears to be rather high and may be explained by the fact that there are certain limitations to the use of light-metal pistons in cylinders of large bore, due to the high coefficient of heat expansion of these pistons, and to forestall trouble from this cause comparatively large amounts of metal are put into the heads of these pistons to facilitate heat conduction and keep down maximum temperatures. It would seem that the 2.6th power of the linear dimensions of the cylinder is a fair measure of the reciprocating weight, including both the piston and the upper end of the connecting rod.

The inertia forces on the reciprocating masses are proportional to the weight of these masses, to the length of stroke and to the square of the number of revolutions. Hence, in terms of the linear dimensions the inertia forces will be proportional to

$$d^{2.6} \times d \times (1/d^{0.5})^2 = d^2$$

The projected bearing surfaces which must sustain the loads due to the inertia forces also vary as d^2 , hence if the speed of rotation varies as $1/d^{0.5}$, the loading of bearings due to inertia forces will be independent of the linear dimensions. Even if the reciprocating weights and rotating weights should vary slightly faster than $d^{2.6}$ there need be no appreciable increase in the specific bearing loads, for in the larger engine some additional bearing surface can be gained by cutting down on the losses of bearing surface due to oil grooves, fillets, etc.

In the foregoing the effect of pumping capacity and inertia forces on practicable engine speed have been discussed. The power of the engine, of course, depends

on two factors, viz., the amount of combustible charge which can be passed through the engine in unit time and the efficiency with which the charge can be utilized in the cylinders, that is, the thermal efficiency. The latter factor varies with the compression ratio. The maximum useful compression ratio of an engine varies with many design factors, but if we consider designs to be exactly similar except for size then the ratio depends only on the linear dimensions or on the displacement per cylinder.

It is well known that if the size of a cylinder is increased, all other things remaining the same, the compression ratio must be decreased if equally smooth operation is desired. It is probably impossible to arrive at any relation between cylinder displacement and maximum useful compression ratio on the basis of theoretical reasoning, and in seeking to derive an empirical relationship from practical data the greatest caution must be used. It is almost impossible to obtain a dependable relationship from data of passenger-car engines alone, because the cylinder capacities of these engines cover only a comparatively small range. A comparison between engines designed for entirely different uses, such as passenger car and aircraft engines, is equally unsatisfactory. Aircraft engines carry substantially the same compression ratios as the most advanced designs of automobile engines in spite of having much larger cylinder displacements, this being permissible because the former are intended to use a better grade of fuel and not to operate under full throttle at ground level for any length of time.

Probably the safest basis of comparison is between regular passenger car engines and high-speed bus engines. This gives a range in cylinder displacement of from less than 30 to more than 100 cu. in. Even then the question arises whether the designs are tolerably "similar." An analysis of selected data of this kind leads to the conclusion that the maximum useful compression ratio varies inversely substantially as the 0.2th power of the displacement of the individual cylinder. For modern high-speed passenger car and bus engines this maximum useful compression ratio is given fairly closely by the equation

$$r = 11/(D^{0.2})$$

Doubling Power

CAN the horsepower of an engine be doubled by doubling the piston displacement?

The answer, according to Mr. Heldt's reasoning, is negative, chiefly because of the impossibility of maintaining the same speed of revolutions, but also because of the necessity of reducing the compression ratio in order to achieve the same smoothness of operation as the original engine.

This gives a ratio of 5.5 for a passenger car engine with 34 cu. in. per cylinder and a ratio of $4\frac{3}{8}$ for a bus engine of 100 cu. in. per cylinder.

The maximum horsepower of an engine cylinder varies, of course, with its compression ratio, the relation between horsepower and compression ratio being the same as that between thermal efficiency and compression ratio. This latter relation is expressed by the equation

$$e = 1 - (1/r)^n$$

where n is usually taken as equal to 0.3. If in this equation we substitute the value of r in terms of the cylinder displacement we get

$$e = 1 - (D^{0.06}/2.05)$$

This shows that the larger the cylinder the smaller will be the thermal efficiency. If we combine this expression for the thermal efficiency with the expression for the pumping capacity we get an expression for the power output per cylinder in terms of the cylinder displacement. We found that the pumping capacity is proportional to the 2.2th power of the linear dimension, and since bore and stroke are supposed to vary equally, it will be proportional to the 0.733 power of the displacement. Hence,

$$H.P. = c D^{0.733} (1 - (D^{0.06}/2.05)) =$$

$$c [D^{0.733} - (D^{0.813}/2.05)],$$

where c is a constant. The value of this constant for an average modern high-speed engine is 2.6, hence the horsepower of a cylinder can be expressed by the following equation:

$$H.P. = 2.6 [D^{0.733} - (D^{0.813}/2.05)]$$

In Fig. 1 herewith the horsepowers and maximum useful compression ratios for different sized cylinders, as calculated by means of the equations developed in the foregoing, are plotted.

It is more convenient to think of the power output varying directly as some power of the cylinder displacement, rather than as a compound function of same. If we take the horsepower values given by the equation developed in the foregoing for displacements of 35 and 100 cu. in. respectively, we find that they vary as the 0.57th power of the displacement. It is interesting to mention in this connection that in Italy the annual tax is based on a horsepower formula according to which the horsepower varies as the $2/3$ power of the displacement. This latter equation evidently is based on the assumption of constant gas velocity through the ports

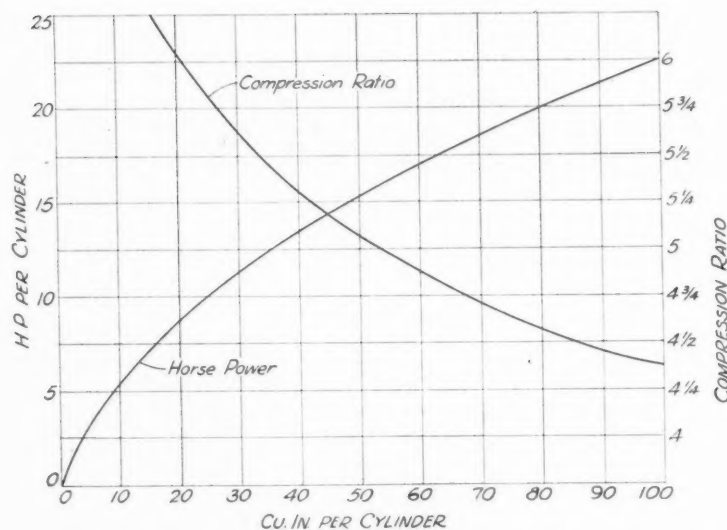


Fig. 1—Chart showing relation between cylinder volume, maximum useful compression ratio and horsepower per cylinder of modern high-speed road vehicle engines

and of a constant compression ratio. Then the valve-port area varies as d^2 or $D^2/3$, and with constant gas velocity through the valve ports and constant thermal efficiency (compression ratio) the horsepower varies directly as the valve-port area, that is, as $D^2/3$ or $D^{0.66}$.

This theory that the horsepower of an engine varies as the square of its linear dimensions was arrived at about 25 years ago by F. W. Lanchester in connection with the search for a workable tax-horsepower

formula carried out in England. At that time because the maximum useful compression ratio probably was considered dependent upon the fuel only, the influence of the cylinder size on it was neglected.

WEATHER POINTS TO BETTER SALES

(Continued from page 608)

far in excess of the 1929 figures. But the experience of the last quarter of 1929 and the first four months of this year indicate that history is repeating itself—Europe has never reacted to either boom or repression as quickly as the United States. It always has taken Europe longer time to recover from a slump than it has this country. When the sharp recession in tourist travel to Europe occurred last Fall, a lot of money that was expected by the Europeans never got into their pocketbooks. Foreign correspondents for *Automotive Industries* are not inclined to be exercised over the possibility of a working cartel against American automobiles, but they point to past experiences in retaliatory tariffs which were passed as protests to tariffs legislated in Washington.

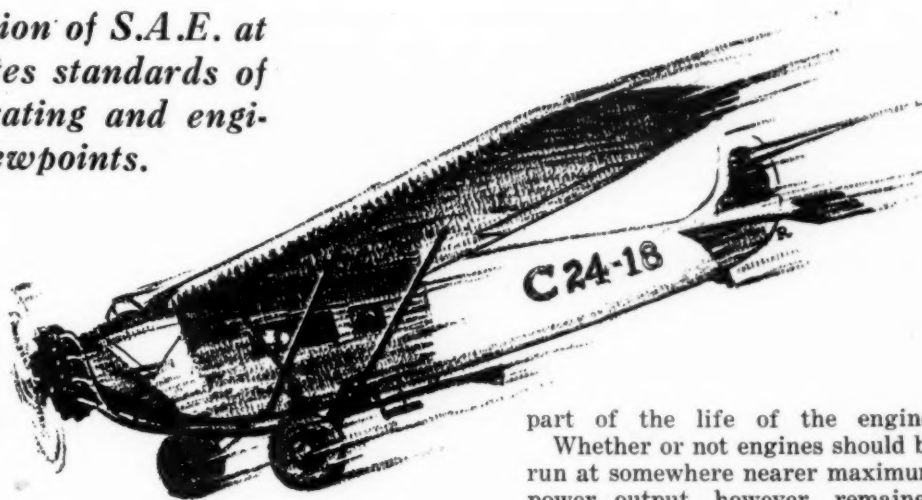
An interesting note from Detroit was the recent announcement by several large manufacturers of medium-priced cars that these manufacturers had ordered commitments far in excess of their average monthly production this year. Several companies report that their dealers' stocks are lower than they have been for years, and that dealers are beginning to build up inventories again.

Several companies, too, are giving a great deal of assistance to their dealers in moving used cars. Factory men have been working on the used car problem as a prerequisite to building up new car sales.

Reports made to sales executives of several of the larger companies indicate that sales this next quarter will be in line with the 1928 figures. Several sales managers of medium-priced cars are inclined to think that the low-priced cars will continue to show increases, which will reduce these estimates to considerably smaller figures, however, but some are optimistic and say they expect to do as well as they did the year before last.

Airplane *Lightness* vs. *Durability* *Debatable* Problem

Aeronautical session of S.A.E. at Detroit investigates standards of design from operating and engineering viewpoints.



SHOULD an aircraft engine for transport planes be designed for the maximum lightness with relation to normal operation, assuming that this is about 80 per cent of rated r.p.m., or 50 per cent of maximum horsepower, or should it be designed durable enough to enable consistent operation at full throttle, at the expense of increased total weight? That was one question on which there seemed to be considerable difference of opinion at the aeronautical section of the S.A.E. in Detroit last week. It arose as the result of a paper entitled "Airplane and Engine Requirements From an Operator's Viewpoint," by E. P. Lott, manager of operations, and Wesley L. Smith, superintendent, Eastern Division, National Air Transport, Inc. The question was first raised by Harold Caminez, of Allison Engineering Co.

Mr. Lott stated that N.A.T. planes were flown at 80 per cent "full throttle." E. P. Warner, chairman of the session, pointed out that foreign air transport companies operate at higher percentages, but that overhauls were more frequent. J. Hartson, of Comet Engine Co., stated that Boeing overhauled engines at 200-hr. intervals. B. H. Gilpin, of Pratt & Whitney, stated that other companies operating Wasp and Hornet engines overhauled them at periods ranging from 200 to 500 hr., and that one operator was going to 750-hr. intervals. H. K. Cumings, representing the Bureau of Standards, said that the bureau would be happy to increase requirements on engines to insure reliability at higher output demands, suggesting a 50-hr. wide open, preferably non-stop test, if considered desirable.

Fewer Overhauls Offset Costs

Mr. Hartson further questioned Mr. Lott whether operators would consider desirable a purely transport engine designed for 500-hr. intervals between inspections, lower in fuel consumption, but slightly higher in weight and cost. Mr. Lott believed that such a development would be highly desirable, provided the fuel consumption is sufficiently low to offset the added weight. The increased cost could be offset by the reduction of overhauls usually found to be necessary during the early

part of the life of the engine.

Whether or not engines should be run at somewhere nearer maximum power output, however, remained unanswered. Mr. Lott did say that

his company would be glad to increase the r.p.m. when the engines stood up better, but that in the meantime any increase in normal or cruising speed would mean too rapid a multiplication of powerplant troubles, and reduction in period between overhauls. The latter, he thought, should be avoided, especially until engines are more easily removed from the airplane for servicing. This had been another point in Mr. Lott's and Mr. Smith's paper, the authors placing much of the blame on the mass of wiring and plumbing between the engine and the airplane, the "no man's land" in airplane construction, which is the direct responsibility of neither the engine nor plane manufacturer.

Twenty-one Suggestions

Other suggestions which were incorporated in this paper included the following:

1. Designing engineers should spend more time in the field in actual contact with operating personnel.
2. More consideration should be given in the design of the plane to the equipment which it will have to carry in transport service, in the same manner that such accessories are provided for in automobiles.
3. Cowling similar to that on automobiles, providing easier access to the engine. Also provision of rawhide lacing where there is relative cowl movement.
4. Provision of shock absorbing units in the engine mounting, to prevent the transmission of vibration to the airplane, as in automobiles.
5. Building of the fuel system in one unit, attached to the engine, of which it is a part, and operated by remote control, as far as necessary.
6. A reliable fuel gage should be available.
7. A reliable flowmeter should be available to provide for better adjustment of the mixture control while the plane is in flight.
8. Light but rigid conduits for the increasing wiring on airplanes should be made available.
9. Closer adherence to S.A.E. standards for threads,

etc., to enable interchangeability and replacement of parts.

10. Completely enclosed anti-friction bearings are desirable for control system mounting, including spark and throttle control.

11. Ball or roller bearings should also be used in wheels rather than bushings to permit more effective and consistent brake operation, through better concentricity.

12. All fittings wherein movement must take place should be bushed and capable of easy rebushing when necessary.

13. Tail skids and anchorages are too weak. Tail wheels depend for their universal use on better brakes. (See 11.)

14. Better ventilation should be supplied to cockpits, interconnected with the heater for simplification.

15. Carburetors should be redesigned to permit small particles of water and dirt to pass through the jets, or provision should be made for removing them from the jets with the airplane in flight. Similarly it should be possible to drain all strainers while in flight.

16. Downdraft carburetors, located on top of the engine, should be provided to keep them from picking up dirt from flying fields.

17. Engine thermometers would be replaced well by thermocouples imbedded in the head and flange of the hottest cylinder, in the inlet manifold above the carburetor, scoop below the latter, intake oil line, outlet oil line, and in the outside air, all connected to a switch so that the operator could make any reading by switching around, with but a single dial, and adjust the cowlings better.

18. Shutters whether in the cowlings of air-cooled engines or in front of radiators would have large bearings with replaceable bushings.

19. Spark plugs and wires should be protected from oil and moisture and radio shielded.

20. Durability should be given more consideration, instead of only weight, horsepower and gas consumption.

21. Operators should get together and standardize on pipe fittings for plumbing, instrument connections, cockpit layouts, etc.

In his paper, Mr. Lott stated that 22 cents of the operator's dollar was being spent at present on parts and labor to keep the equipment flying.

Superchargers on Commercial Planes

THE pros and cons of supercharging in commercial planes received another airing following a paper entitled "Geared Centrifugal Superchargers for Airplane Engines," presented by Sanford A. Moss of the General Electric Co. A prepared discussion, by Arthur Nutt of Curtiss Aeroplane & Motor, presented by Marsden Ware of the same company, paved the way. Mr. Moss had indicated the various advantages and history of development of the centrifugal supercharger, pointing out that all transport plane engines are now supercharged. Mr. Nutt, however, stated that if the supercharger could be eliminated from a commercial engine without too much sacrifice in performance, even at the expense of some added weight, such a move would be desirable.

Various points made were that superchargers enabled even bigger gains on small than on large engines, that superchargers were an unnecessary complication on small engines, etc. George W. Lewis of the National Advisory Committee on Aeronautics, suggested that it might be possible to get good economies with super-

charged low compression engines (around 4 or 4.5 to 1) with the added advantage of inherent reliability obtained through the use of the lower compression ratio. Mr. Nutt and Mr. Moss also differed on the point of complications involved in adding a supercharger, Mr. Moss contending that the built-in supercharger was easy to build in, while Mr. Nutt contended that it complicated the accessories drives, especially on radial engines.

Weight Savings in Dollars

IT is generally appreciated that light weight in an airplane is desirable, but this is also qualified by the necessity of not unduly increasing the cost of an airplane. E. P. Warner, president of the S.A.E., tackled this question from a dollars and cents point of view in a paper he presented at the aeronautical meeting, in order to approximate just how far an airplane designer is justified in going to reduce his finished ship weight, especially where it is designed for transport operation.

Method of Computation

In order to make this analysis, Mr. Warner selected the method of assuming that the payload remains unchanged, varying the power, etc., with the weight of the ship or engine, believing this method more satisfactory than that of assuming that 1 lb. of payload replaces every pound saved, with constant horsepower.

Mr. Warner's first step was to make the following assumptions, based, he stated, on the best obtainable data:

1 lb. saving in the structure results in 2½ lb. gross saving (total).

Powerplant cost is approximately \$14 per hp.

Airplane cost is approximately \$8 per hp. plus 1.2 times gross weight.

Average gross weight of ship is 15 lb. per hp.

Fuel and oil cost is 2.25 cents per hp. per hr.

Insurance is 16 per cent of cost, equivalent to 10 per cent average cost through the life of plane and engine.

Interest on investment or net profit should be 8 per cent of first cost.

Engine depreciation is 35 per cent per year, based on 800 hr. per year.

Plane depreciation is 20 per cent per year, based on 800 hr. per year.

Transport planes cruise at 60 per cent maximum horsepower.

With these assumptions, Mr. Warner calculated the following reduction in cost on a yearly basis:

Depreciation, insurance and investment, engine..	\$1.26
plane...	1.56
Hangar and handling cost, at 50c./lb.	1.25
Fuel and oil (800 hr.)	1.76
Engine maintenance expense at 0.3c./hp./hr., with an average variation of 50 per cent	0.20
Plane maintenance expense at 0.04c./hr./lb., with an average variation of 75 per cent	0.60

Total reduction per year per lb. of weight saved.. \$6.63

It was next necessary to figure the increase in original cost offsetting this saving, on a yearly basis. For this Mr. Warner assumed x to be the total saving, which would be either $.53x$, or $.38x$, for engine or plane respectively, wherever the saving was made. (Depreciation, insurance and investment per year.)

It was next assumed by Mr. Warner that the increased cost of maintenance due to the higher cost of engine or plane was 0.02 per cent per hr. for both. Figured

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WASHINGTON

EXPECTS STURDY BUSINESS GROWTH

By NORMAN G. SHIDLE

WHEN times are good, business looks within its own structure for the sources of its current prosperity.

When times are hard, it frequently turns to Washington for an explanation.

Government officials, Senators, executives of national business organizations and movements all find themselves, in periods of industrial crisis, objects of queries, questions and criticism. Certain it is that automotive men, like other industrial executives, give every evidence of being more interested today in the actions, ideas and information being spaded up at the nation's capital than at any other moment in their business history.

And plenty of practical, vision-helping concepts can be unearthed down there by prying automotive minds these days.

Unemployment, export prospects, economic consequences of tariff action, farm board activities, progress of the government building program, business application of census returns—these are just a few of the subjects with which automotive men must be vitally concerned as they try to peer around the corner of spring and peek at automotive business possibilities for the summer and fall of 1930.

That is our excuse for having taken several days off from thinking directly about automobile production, new and used car sales, factory-dealer relationships and other direct automotive considerations to play gentleman-at-the-keyhole in Washington for a time.

That the government building program and the maintenance activity campaigns are going over successfully seems to be generally agreed, although differences of opinions about most other subjects exist. In the progress that has been made recently throughout the building field, as a matter of fact, lies the one most encouraging economic fact for automobile men, who naturally look to a recovery of general business as essential if our own industry is to regain its highest levels.

Only in the realm of household repairs and home building has recovery lagged, it would seem, and definite stimulation of repair work in the home is being undertaken. Being so important a factor in national prosperity, this advancement of building employment to

higher levels can be accepted as most encouraging.

Unquestionably, the conferences held by President Hoover immediately following the Wall Street collapse and the activity subsequently carried forward through the National Business Survey Conference under the leadership of Julius Barnes have demonstrated their

practical utility. It is fair to say that they have shown it to be possible to alleviate materially the worst conditions to which business depression might otherwise have sunk.

While the automotive export outlook for the immediate future is not bright, experts warn against any general condemnation of foreign markets. The broad and general picture can be painted only in relatively dull colors, they point out, yet specific study of individual markets as related to particular products will turn up many spots of sunshine where certain products can be sold immediately in good quantity.

The highly selective nature of the export situation probably is its outstanding characteristic from an automotive standpoint at this moment.

The tariff and the export outlook are inseparably associated so far as any automotive view-

point is concerned. Some of the best informed men in Washington, it is true, feel very definitely that the possible influence of the U. S. tariff on our automotive foreign trade is being greatly exaggerated in many quarters. Nevertheless, it is hard to discount entirely the various anti-American demonstrations which have taken place in a number of foreign countries as certain extreme schedules have appeared likely to be incorporated in the final U. S. tariff legislation.

It is much easier for men in other industries than ours to be philosophical about the possible adverse effects on export trade of the tariff bill. A large share of any retaliation against the United States that may accrue from what foreigners consider unfair tariffs here is certain to be directed against automotive products in general and against complete motor vehicles in particular. The automotive executive, needing an expansion of his foreign markets this year as never before, can scarcely be expected to view, with Buddhistic calm, violently voiced objections to American tariffs from European nations which speak not only for the small

FOR TEN YEARS

The National Conference of Business Paper Editors, of which Automotive Industries is a member, held conferences in Washington recently with a number of very important government officials, national business leaders and others close to current economic development in its most fundamental phases.

These conferences were a continuation of a series of similar meetings between this group of editors and leaders at the nation's capital begun over ten years ago.

territories occupied by their nationals but also for their extensive colonial possessions in all parts of the world.

At any rate the final passage of a tariff bill and the settling of the uncertainty surrounding the whole tariff procedure will unquestionably have a stabilizing effect throughout American industry. In this respect the early signing of a tariff measure can be placed on the credit side of the business ledger to help improve the profits which manufacturers hope for during the last three quarters of this year.

All questions of tariff aside, however, the export outlook for the immediate future is viewed with some skepticism by men who are spending their lives in study of this phase of our merchandising. One outstanding expert the other day sketched the immediate outlook as regards foreign sales in rather dull colors. Latin-America and South America, he said, have experienced a depression in the price of staple commodities. Being largely one-crop markets, this blow is serious. The situation in Australia, he stated, is unsettled because of an extreme labor policy. Political discontent isn't helping matters in India, while many parts of China still are oppressed with civil strife. The European situation is fraught with uncertainty, in this man's opinion. He added that Japan is a bright spot in the export picture.

Thus it would appear that, while persistent effort and sound, vigorous merchandising should be able to hold our automotive exports at reasonably good levels during the rest of 1930, there is scant hope of any major increases in volume for a little while to come.

This situation, it is worth remarking in passing, calls for unusual care in sticking to fair, sound, long-swing marketing methods in current export work. "Dumping" or other merchandising malpractice on the part of American automotive manufacturers at this time can only result in increasing future exporting hard-

ships. American automotive men, today as never before, should pursue a long-view policy to get the full benefit of a market which will continue to absorb an increasing percentage of our fabricated automotive products.

Considerable unemployment still exists. How serious this factor is depends upon point of view and comparison points. The automotive industry is under fire as regards employment instability to a greater extent than many others.

Buying power increases in direct relation to employment, of course, and for this reason a high percentage of men at work means much to automotive prosperity. The best data available does indicate that the nation has been through worse periods of unemployment, however, and that fewer men are unemployed today than were three months ago.

Recent actions of the Farm Board are being censored severely and praised gloriously by men in important governmental and business positions. The man whose opinions seem to us worth more than that of any others, told us recently that he believed that:

"The Farm Board by its recent actions has saved the country from a calamity far greater than anything brought about by the stock market crash. The board deserves the praise of business men in every line of industry—which it will not get."

He emphasized, however, the fact that, in his opinion, such actions were justified only as temporary measures in time of great national calamity.

The business picture as viewed through Washington eyes can be summarized somewhat as follows:

Business has definitely passed its low point. Definite evidences of steady advances are apparent all through the business structure. Quick, sudden upturn of buying is not to be expected, but sturdy successful resistance to downward influences is certain.

Airplane Lightness vs. Durability

(Continued from page 618)

in the same manner as under cost saving, this meant that if a lb. of weight were saved in the engine the increase in cost would be $0.61x_e$ and if in the plane, $0.46x_p$. Therefore, either

$$x_e \text{ equals } \frac{6.63}{.61} \text{ or } x_p \text{ equals } \frac{6.63}{.46}, \text{ giving:}$$

$$x_e \text{ equals } \$10.87 \text{ or } x_p \text{ equals } \$14.41$$

Thus Mr. Warner, on the basis of the assumptions made, concluded that if a lb. of weight could be saved in either plane or engine at a cost of less than \$14.41 or \$10.87 respectively, such a saving would be well worth while.

To the objection which might possibly be raised that this method of figuring could be applied to all vehicles of transport, even to flat cars, Mr. Warner stated that such an analogy would not hold, as the tremendous mileage which an airplane covers yearly and the increased cost of fuel per mile per hour flown is true of the airplane alone.

In the discussion following Mr. Warner's paper suggestions were made to bring the material home to the operators, in view of their stated tendency to add items of equipment without reference to increase in weight. Other suggestions included one to the effect that more attention be given to lightening the tool kit carried on Transport planes. A. W. Winston, of Dow Chemical,

announced that his company would soon have available magnesium alloy tubing, rods and sheet at reasonable prices.

The Value of Gliders

GLIDERS also formed a topic of discussion during the S.A.E. aeronautical meeting, with a paper by William J. Perfield, engineer, Stout Engineering Laboratories. "The practical value of gliding to modern aviation is much debated," Mr. Perfield said in introducing his subject. "Certainly it is in some respects an asset to the aeronautical industry, but the point of greater concern at the moment is the distressing liability it may become if not properly directed."

Regarding glider design, Mr. Perfield stated among other things that the wing loading of a primary ship should be around 2 to 2.5 lb. per sq. ft. Adjustable seats should be provided to take care of variations in the pilots' weights. Open ships are better for primary training, due to the fewer number of breakable parts.

Mr. Perfield also recommended the use of struts in place of wires for wing bracing, stating that their larger weight and lower aerodynamical efficiency is offset by the avoidance of necessity for adjustment and the greater ease of assembly and disassembly.

Finance Companies Acted as Buffer During Fall Depression

*Delinquencies and repossessions
in the first four months following
the stock market break increased
very slightly over previous year.*

SOUNDNESS of finance companies, which continued to supply funds for sales during and after last fall's depression, prevented, to some degree, far greater paralysis in business and industry.

Heretofore, when Wall Street has been shaken up on a scale at all comparable with last October's, the effect on the manufacturing industries was far-reaching for many reasons. One of these was the fact that, as soon as retail purchasing let up, the retail merchant became slower in making his payments for merchandise already purchased. And the manufacturer soon found his capital tied up in accounts receivable and inventories, and was in such a frozen condition that he was unable to carry on further manufacturing activities. Consequently he had to lay off a large part of his production force, thus adding to the unemployment situation and making the period of depression by that much the worse.

While present conditions are by no means ideal, those affecting this particular phase are unquestionably improved. Analysis of the assets side of the balance sheet of important manufacturing companies as of Dec. 31, 1929, when compared with those of Dec. 31, 1920, for example, will show proportionately a much smaller amount frozen up in accounts receivable and inventory in the later one than in the earlier one. Perhaps the main reason for this is that the growth of intermediate credit facilities has made it possible for the manufacturer to realize his money from his product almost as soon as it is manufactured. At least this is generally true of merchandise like the automobile that is so costly that much of it is purchased on the instalment plan.

Today when an automobile manufacturer produces a car, it is shipped to the dealer or distributor who

By
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either pays for it in cash, or finances it through some finance company. Thus the manufacturer immediately receives back his invest-

ment in that car, and has the money to use in further production or where needed. The sale to the consumer in turn may be financed through the finance company, so that the dealer can

collect his money as soon as the sale is made. The finance company, by spreading the load out over twelve months and being specially organized to handle the collections, remains in liquid shape and is in a favorable position to borrow during times of financial stress.

Because of its own capital and its independent bank credit, the finance company is able to absorb much of the shock that would otherwise be felt vertically through the business from retail customer to manufacturer and back again, without in itself being put to any very excessive strain. Thus the manufacturer not only has most of his own capital available for use when needed in manufacturing processes, but is in a much better position to secure any needed credit from his bank because of his more liquid state. In other words, the manufacturer's inventories are now in the hands of his retail consumers instead of in his warehouse, and his receivables are in the hands of a finance company whose one business is to buy accounts receivable, charging a reasonable price for their service. His capital and credit standing are unimpaired as far as any back-up is concerned, and he is free to proceed with new business as rapidly as he can develop it.

To be sure, the finance company does find that its delinquencies and repossessions increase somewhat at times like the present, but experience seems to point to but slight increase in this particular. The large automobile finance companies, for example, have found that delinquencies increased very slightly over the

How Eleven Years' Sales Were Financed

(Assuming a Uniform Rate of Carry-over)

Year	Total Cars Sold		Cars Sold on Instalments		Per Cent Sold on Instalments			Used Sold in Per Cent of New
	New	Used	New	Used	New	Used	All	
1919	1,850,982	1,086,526	1,201,287	483,504	64.9	44.5	57.4	58.7
1920	2,056,631	1,336,810	1,266,885	636,322	61.6	47.6	56.1	65.0
1921	1,555,928	1,095,373	994,236	555,354	63.9	50.7	58.4	70.4
1922	2,446,426	1,685,588	1,558,373	869,763	63.7	51.6	58.8	68.9
1923	3,793,212	2,594,557	2,465,588	1,421,817	65.0	54.8	60.9	68.4
1924	3,317,170	3,025,259	2,335,288	1,736,499	70.4	57.4	64.2	91.2
1925	3,837,794	3,791,740	2,617,376	2,381,213	68.2	62.8	65.5	98.8
1926	3,985,998	3,563,482	2,570,969	2,323,390	64.5	65.2	64.8	89.4
1927	2,998,085	3,552,731	1,738,889	2,259,539	58.0	63.6	61.0	118.5
1928	3,783,437	4,426,621	2,198,177	2,691,385	58.1	60.8	59.5	117.0
1929	4,612,864	5,601,200	2,808,525	3,626,577	60.9	64.7	62.9	121.4

National Association of Finance Companies

previous year during the first four months or so following the break and are quite confident as to the net results they will show after the storm is over.

From the above, it seems evident that when the ultimate consumer's load is spread out sufficiently thin so that he can carry on over such periods as we have just been experiencing, he will be able to meet his obligations with a fair degree of regularity, particularly when his income on the average is not endangered by widespread industrial shutdowns. When, therefore, the finance company has sufficient resources and exercises proper supervision over its investments, it appears to stand a good chance of weathering such conditions with little loss, and its experience in the past seems to prove this. Bankers with many years of experience report that during times of financial stress, those well-organized finance companies whose scope of operation is sufficiently broad to remain materially unaffected by purely local conditions, have been the

surest of meeting their bank obligations right on time.

It is because the finance company is thus enabled to relieve the manufacturer of the necessity of carrying large inventories and heavy accounts receivable through a period of money unsettlement that it has contributed its share toward reducing the manufacturing depression usually following upon a Wall Street crash. While its stimulating effect on new sales is no greater during such a period than during more normal times, it spreads the load existing at any given time over a period of approximately twelve months and permits the manufacturer to utilize his capital for manufacturing against such new business as does appear instead of having it frozen. The dealer, too, is helped to carry on during such a period.

It is obvious therefore, that, as a cushion distributing the load, the consumer credit and the intermediate credit operation of a finance company helps during times of financial difficulties.

Purity No Guarantee Against Corrosion

IN a communication to *Engineering*, Ulick R. Evans of the University Chemical Laboratory, Cambridge, states in substance that the view generally held that pure iron is remarkably immune to rust and that pure zinc does not pass quickly into solution like commercial zinc is erroneous. He admits that 10 years ago he himself held this view but that it cannot be maintained in the light of recent research work. He discusses the subject as follows:

"Zinc—The exceptionally accurate work of Bengough, Stuart and Lee (*Proc. Roy. Soc. (A)*, 1927, 116, 425; 1928, 121, 88), proves definitely that, even spectroscopically, pure zinc is corroded quite appreciably by the purest conductivity water; addition of salts to the water increases the rate of attack, which is approximately as rapid as that of zinc containing small amounts of impurities. In regard to atmospheric corrosion, Vernon's indoor tests (*Trans. Faraday Soc.*, 1924, 19, 839) reveal only a slight difference between the different "grades" of zinc, while the outdoor tests conducted by Hudson (*Trans. Faraday Soc.*, 1929, 25, 177) in five different localities, indicate that there was practically no difference between electrolytic zinc and "ordinary" (impure) zinc. Patterson (*J. Soc. Chem. Ind.*, 1927, 46, 390T) has investigated the various impurities one by one; in an indoor saturated atmosphere, he finds that the addition of small amounts of iron, lead, cadmium, copper or antimony to zinc has no pronounced effect on the corrosion; in outdoor exposure, lead produces slight retardation of the attack, copper or antimony accelerate it, while cadmium and iron have no appreciable influence. In the case of immersion in acids, the effect of minor constituents is more pronounced; the measurements of Vondracek and Izak-Krizko (*Rec. Trav. Chim.*, 1925, 44, 376) show that, while some constituents notably accelerate the corrosion of zinc by acids, others greatly retard it; the same conclusion was reached by Patterson (*J. Soc. Chem. Ind.*, 1926, 45, 325T).

"Iron and Steel—Here again, the effect of minor constituents is most important in corrosion by acids. The extensive measurements of Endo (*Sci. Rep. Tohoku Univ.*, 1928, 17, 1245) indicate that certain constituents accelerate attack by acids, while others retard it. In neutral liquids, under the conditions of 'differential

aeration,' which usually prevail in service, the anodic and cathodic areas are not the metal and carbide particles. The E.M.F.'s are set up, not by variations in the metal, but by variation in the oxygen-content of the liquid, producing anodic and cathodic areas enormously larger than the size of the grains; the generation of this 'differential aeration current, does not depend on the presence of a second phase in the metal, and can proceed with pure iron. Measurements at Cambridge University (*J. Chem. Soc.*, 1929, page 111) have shown that, in many liquids, pure electrolytic iron is attacked nearly as quickly as mild steel, under conditions of differential aeration. On the other hand, under conditions of uniform oxygen concentration, pure iron is often much less attacked than impure iron, largely because the invisible oxide-film which, if continuous, renders the metal passive, is interrupted by the presence of a second phase. (This oxide-film is the result of direct oxidation, and must be distinguished from 'rust,' which is an indirect corrosion-product; the oxide-film is 'invisible,' while on the metal, being too thin to produce interference tints, but is perfectly visible when isolated from the brightly reflecting basis). (*J. Chem. Soc.*, 1927, page 1020; 1929, page 92, 2651.)

"As regards atmospheric exposure, purity, as such, fails utterly to give the desired resistance. In the tests conducted by the American Society for Testing Materials (*Proc. Amer. Soc. Test. Mat.*, 1928, 28, Part I), involving the exposure of over a thousand specimens, the purer forms of commercial iron (low in carbon and manganese) have given very disappointing results. In England, Friend's lengthy tests (*Carnegie Schol. Mem.*, 1929, 18, 62) indicate that several elements tend to increase the resistance to atmospheric attack, while the study of weighed specimens exposed outdoors to the Cambridge atmosphere show that, although electrolytic iron develops less rust than mild steel during the first few days, it has suffered quite as much rusting as steel after six months. No doubt, yet more work is required, and is being planned elsewhere. Probably certain impurities will be found definitely to be dangerous, but it is extremely improbable that the cure for corrosion will ever be found in the use of 'pure' metals," Mr. Evans concludes.

Just Among Ourselves

Good Weather Helps Sales— But Driving is Tougher

SPRING finally seems to have arrived—actually. We never did take much stock in this official date for the beginning of spring; it's all right astronomically, but good weather really has to get here before automotive car and replacement business opens up.

And coincident with this arrival of actual spring our old friend the Traffic Problem is getting on his summer togs and preparing for his biggest and best year. He's been doing his best to help the industry abolish use of the term "pleasure car" and has been more effective in that regard than any economic propagandist in the industry.

But he's going to be given a tougher battle than ever before. The hosts of Hoover, long assembled under the impressive cognomen, National Conference on Street and Highway Safety, are girding their loins anew. The multitudinous organizations comprising this group will meet in Washington for another national conference near the end of May. Since the genesis of this conference some real progress has been made toward greater uniformity of highway regulations in various states. The uniformity isn't yet so great that you will notice it much as you drive around this summer, but it is expected that the per person bawlings-out-by-the-traffic-cops will show some decrease at least from now on.

* * *

Management's Test Will Show in Quarter's Profit

FIRST quarter profit statements of automotive companies will be making their appearance soon. While it is certain that a majority of them will show up unfavorably as compared with 1929, our guess is that some very interesting things will be developed by

study and comparison of the various earnings statements.

The quality of management—including everything that might be listed under this word used in its broadest sense—will be shown to have played a larger part in determining first quarter earnings this year than in any previous quarter for some time past. Our guess may be proved wrong, but we strongly incline to the belief that the relation between profits and production will be found not to have shifted in anything like equal proportions for all automotive concerns. An equal drop in output, in other words, will not mean an equal drop in net earnings when comparisons are made for these first three months of 1930.

At any rate, it will be interesting to analyze and compare a lot of statements on some such basis. Any major differences which may appear, can, we believe, be attributed largely to that intangible factor called management.

* * *

Only One Airplane Fatality Every Other Day in 1929

THERE were 183 fatal airplane accidents in the United States in 1929, according to C. M. Young, Assistant Secretary of Commerce for Aviation. Every one of them must have been on the front page of every metropolitan daily in the country. Without having looked at statistics for some time, wasn't it your impression that a good many more people than that had been killed in airplane accidents last year? Asked a sudden question, our guess certainly would have been higher.

We wouldn't be surprised to learn that more people were killed by falling down stairs last year than in airplane accidents. (Yes, we realize that millions of people walk down stairs every day to one that flies.) Just the same, death re-

sulting from air travel undoubtedly still gets a good bit more publicity per fatality than does death coming in almost any other form.

In 1929, Mr. Young says, 431,367 miles were flown in this country per fatal accident as against 416,837 miles per fatality in 1928. So we are making progress toward greater safety in the air.

* * *

Development of Census Data Needed for Economic Study

THE census is under way. At a conference in Washington a few weeks ago we heard President Hoover characterize the census as the datum point from which all of our economic studies begin. This outstanding engineer-executive was emphatic in his plea for cooperation from industry in making this census the most complete and accurate ever made.

We in the automotive industry need the interpretations and analyses which can be developed from full automotive census facts both in the manufacturing and distributing fields. Let's fill out all the blooming questionnaires and give ourselves as well as the government a "break."

* * *

Reputations—Like Water— Find Their Own Levels

"IT is the inalienable right of every man and woman born to set down those things which to him or her ring 51 per cent true, attaching the usual signature, 'Thus saith the Lord.'"—So spake Salambo, the phrase-hound, erstwhile automobile salesman and automotive reminiscencer par excellence.

It is in this way obviously that reputations are built by automotive engineers, sales managers, production executives, and particularly by business paper editors. And it is because of such building that many of those reputations eventually sag to normal levels. Selah!—N.G.S.

Protective Properties of Elec Analyzed by British Chemists

Cadmium, zinc, nickel and chromium are tested for comparative values and results discussed before the Institute of Metals at its meeting in London.

IN a paper presented to the (British) Institute of Metals at its London meeting on March 12 and 13, L. Davies and L. Wright, chemists connected with the research department of the Metropolitan Vickers Electric Co., Ltd., gave the results of some tests made by them on the protective values of different electrically deposited coatings. They endeavored to produce deposits under conditions which are in everyday use in plating shops, to produce them to specifications often recommended, and by means of accelerated corrosion tests to obtain some idea of their comparative values.

It had been pointed out by another writer that in industrial atmospheres the SO_4 is in all probability quite as responsible for corrosion as the Cl . The authors felt that the results of other investigations upon the resistance to corrosion in salt sprays of electro-deposited coatings, while giving some indication as to the behavior of such coatings in marine atmospheres, are not comparable with results obtained in industrial atmospheres where the SO_4 predominates. While it may or may not be possible to postulate from accelerated tests the behavior of similar coatings when exposed to atmospheric conditions, the authors felt that with similar accelerated tests for Cl and SO_4 some data would be obtained as to the relative behavior of deposited coatings to these two corroding media.

Specimens of a standard size 3 in. \times 1 in., cut from 1/16-in. sheet, were used throughout the investigations. One-half of the specimens was bent to an angle of 120 deg. across the center before plating, and the other half was plated in a flat state as cut from the sheet.

Corrosion Accelerated

Four types of deposits were tested—cadmium, zinc, nickel, chromium—and these were applied in thicknesses of 0.0001 in., 0.0005 in., 0.001 in., and 0.002 in. to both the straight and bent specimens of steel, brass, phosphor-bronze, and copper.

It was necessary to employ a method by which it was insured that the specimens were provided with the standard thickness. The method used was the measurement of the cathode efficiency of the various electrolytes. This was carried out by using a copper coulombmeter in series with the plating bath.

The plated specimens were submitted to accelerated corrosion tests. These tests were of the form in which the specimens could be brought into contact with a finely divided corroding mist. The type of apparatus used is shown in Fig. 1, and in essential consists of

a chamber in which the specimens could be suspended, and a mechanism for introducing into the chamber a finely divided mist. The fine mist was produced by blowing compressed air into liquid contained in a jet. The fine spray formed in this manner was forced to impinge upon a baffle plate, thus insuring that only the finest mist came into contact with the specimens. Two corroding media were employed in identical apparatus, commercial sodium chloride, 24 grams per liter, and pure sulphuric acid, 0.05 N.

For each run the specimens were suspended from a glass frame within the corrosion chamber. Each batch tested consisted of sixteen specimens of the same thickness of deposit—e.g., deposits of 0.0001 in. of cadmium, zinc, nickel, chromium, on basis metals of steel, brass, phosphor-bronze, and copper, were exposed together. Each batch remained in the corrosion chamber for 14 days, and during this period spraying was carried out 9.5 hours each day, except over week ends, when a resting period of 44 hours occurred.

Total exposure in chamber, 336 hours.

Total actually sprayed, 103 hours.

The temperature of the corrosion chamber was read by means of a thermometer, and readings were taken every day. In all cases the temperature was maintained within 2 deg. C. of 20 deg. C.

Progressive Stages Pictured

Upon the conclusion of the corrosion tests previously described, the specimens were removed from the test chambers and dried out. For the sake of convenience a key to the general results is given in Table I (page 626). In arriving at this method of classification, specimens were photographed, which in the opinion of the authors represented progressive stages in the breakdown of the deposits.

With the chromium-plated specimens it was found that the deposits afforded either no protection whatever or good protection. There were no intermediate stages of breakdown. The protective coatings employed belong to two natural groups—cadmium and zinc are electro-positive to iron, and nickel and chromium, which are electro-negative to iron. It was found that the methods of protection of the cadmium and zinc were similar, but differed as to degree. With steel as the basis metal it found that the degree of protection afforded by zinc was proportional to the thickness of the deposit, but with cadmium the increased protection afforded by a deposit of 0.002 in. was much greater than the increase afforded by increasing the thickness from 0.0005 in. to 0.001 in. With

trically Deposited Coatings

both cadmium and zinc on steel the corrosion of the basis metal was localized. In the case of the zinc-coated specimens it was found that areas from which the protecting coat had been denuded were free from rust. Although the zinc-coated specimens showed relatively less rust than the corresponding cadmium specimens, it was found upon removal of the corrosion products that the attack upon the zinc had been much more severe than upon the cadmium. The rate of solution of the zinc is greater than that of the cadmium, as would be expected from its higher solution potential, but the authors cannot agree that, as stated by another investigator, a thinner deposit of cadmium affords the protection given by a comparatively thicker deposit of zinc. From the specimens examined it was apparent that for equal thicknesses of cadmium and zinc, the intrinsic protection afforded by the zinc more than compensated for the higher speed of solution of the latter.

Life of the Coating

On non-ferrous basis metals, such as brass, phosphor-bronze, and copper, protective coatings of cadmium and zinc are rarely advocated. Tests were included in this investigation in an attempt to ascertain to what extent the difference in the electrolytic potential of the basis metal and the deposit, set up under corrosive conditions, affected the life of the coating. It was found that there was a steady solution of both cadmium and zinc from the brass, phosphor-bronze, and copper without any attack upon the basis metal until the areas denuded of the protective coating were too large to be protected by the preferential solution of the deposit. It was found again that the rate of the solution of the zinc was greater than that of the cadmium, but the zinc was able to protect a greater area of exposed basis metal than the cadmium. In general, it was found that the degree of protection increased with increased thickness. In spite of the difference in contact potential between brass and zinc and copper and zinc, there was no apparent difference in the rates of solution of the zinc coating. Similar results were found for the cadmium-plated specimens.

The protection afforded by nickel and chromium was found to bear no similarity to the type of protection afforded by cadmium and zinc. Although nickel and chromium are generally considered to be electro-negative to iron, there existed a difference in the type of protection they afforded to the basis metals. In the case of nickel on steel an increase in the thickness of the deposit brought about an increase in the

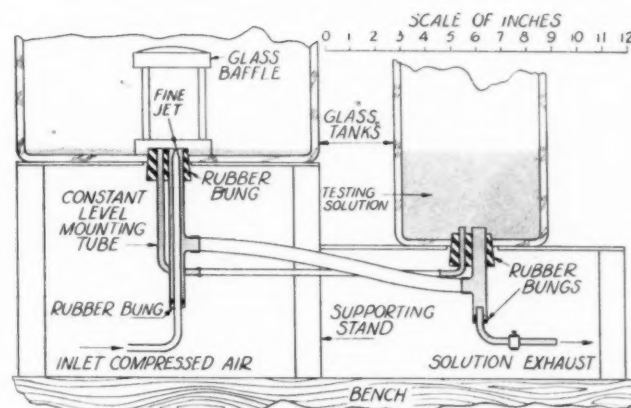


Fig. 1—Apparatus used for conducting accelerated corrosion tests

degree of protection. With the thicker deposits—namely, 0.001 in. and 0.002 in.—this increase in protection was more than proportional to the increase in thickness. With chromium on steel no increase in protection was apparent with increase in thickness. With both deposits the corrosion was localized, but with chromium there appeared to exist a tendency for

the initial pin-point of corrosion to extend its sphere of influence rather than penetrate into the basis metal. On the non-ferrous basis metals a very good degree of protection was obtained from all thicknesses of the nickel and chromium, as reference to Table I will show. From the results obtained it would appear that the protective value of nickel and chromium on non-ferrous basis metals is independent of thickness. This is true for the conditions under which, and the length of time for which, the specimens were tested. But both nickel and chromium are susceptible to attack by Cl^- and SO_4^{2-} , and it is more than likely that had the test been prolonged, or the concentrations of the corroding media increased, ultimately solution of the deposit would have taken place, leaving the basis metal open to attack.

All corrosion phenomena are accompanied by the formation of chemical products. On the cadmium-plated specimens the corrosion of the cadmium was accompanied by the formation of a white product in both the salt spray and the sulphuric acid spray. On subsequent corrosion of the base metal further corrosion products were formed. In the case of steel two types of rust were noticed—dark brown in the initial stages of breakdown, which changed to light reddish-brown in the final stages. On the non-ferrous basis metals the white corrosion products of the cadmium were accompanied by a light green product which followed the attack on the basis metal.

Corrosion Products Described

The corrosion products formed on the zinc-plated specimens were similar in type to those formed on the cadmium-plated specimens. With the nickel-plated specimens the steel basis corroded to form a light reddish-brown rust. The non-ferrous basis metals corroded to form a light green product with the thinnest deposit, while the thicker deposits exhibited no corrosion product but a darkening in color. On the chromium-plated steel bright reddish-brown rust was formed, while on the chromium-plated, non-ferrous metals a very small amount of light green corrosion product was found.

A summary of the corrosion products described

Deposit	Thickness In.	Salt Spray								Sulphuric Acid Spray							
		Bent Specimens				Straight Specimens				Bent Specimens				Straight Specimens			
		S.	B.	Ph.B.	C.	S.	B.	Ph.B.	C.	S.	B.	Ph.B.	C.	S.	B.	Ph.B.	C.
Cadmium	0.0001	A	A	A	A	A	A	A	A	A	A	A	A	C	B	B	C
	0.0005	B	B	C	C	B	B	B	B	B	C	B	B	A	B	B	A
	0.001	C	C	C	C	B	B	C	C	C	C	C	C	A	B	D	D
	0.002	D	D	D	D	C	D	C	C	D	D	D	D	D	D	B	B
Zinc	0.0001	A	A	A	A	A	A	A	A	A	A	A	A	B	C	C	C
	0.0005	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	0.001	B	B	B	B	C	C	B	B	C	C	C	C	C	C	B	B
	0.002	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D
Nickel	0.0001	A	D	D	D	A	D	D	D	B	D	C	D	B	D	D	D
	0.0005	B	D	C	C	A	D	D	D	B	D	C	C	B	C	C	C
	0.001	C	D	D	D	A	D	D	D	C	D	C	C	C	D	D	D
	0.002	C	D	D	D	C	D	D	D	C	D	C	D	D	D	D	D
Chromium	0.0001	A	D	D	D	A	D	D	D	A	D	D	D	A	D	D	D
	0.0005	A	D	D	D	A	D	D	D	A	D	D	D	A	D	D	D
	0.001	A	D	D	D	A	D	D	D	A	D	D	D	A	D	D	D
	0.002	A	D	D	D	A	D	D	D	A	D	D	D	A	D	D	D

Note—S. = Steel. B. = Brass. Ph.B. = Phosphor-bronze. C. = Copper.
The letters A, B, C, D, represent respectively:
A—No protection.
B—Poor protection.

C—Moderate protection.
D—Good protection.

TABLE I.—Comparative
Corrosion of Specimens

ing media were not of sufficient concentration to attack these metals. In accordance with this it was found that there was no appreciable difference in the degree of attack by the salt spray and the sulphuric acid spray upon the nickel or chromium-plated specimens. Whatever corrosion took place in both sprays

was the corrosion of the basis metal. However, both zinc and cadmium were found in the corroding solutions after test, as well as the corrosion products of the basis metals. There was found to be a difference in the degree of resistance to corrosion of the zinc and cadmium-plated specimens in the salt and sulphuric acid sprays, and this must be due to the relative solubilities of the corrosion products. The specimens exposed to the sulphuric acid spray were practically free from corrosion products, while the specimens exposed to the salt spray were heavily coated with corrosion products. The products of corrosion in the sulphuric acid spray are very soluble, and no additional protection is obtained from them. In the salt spray, the retention of the corrosion products provides a further protection, even when the zinc or cadmium has been removed.

Shape of Metal a Factor

Just as the corrosion products can inhibit further corrosion by preventing the corroding media coming into contact with either the protecting coat or the basis metal, so can the shape of the metal inhibit or accelerate the rate of corrosion. This was demonstrated by the use of two types of specimen, straight and bent.

On the straight specimens the corrosion, although localized, was general to the whole surface. On the bent specimens it was found that those portions which were shielded from direct condensation of the corroding mist suffered the least from corrosion. This was noticed on the top inner face. The lower inner face and the top outer face were corroded to a greater extent, and it was on these faces that the corroding mist tended to condense.

The greatest corrosion on the bent specimens was found to be just below the bend on the inner surface. At this point there was a tendency for the corrosion products to be washed away, because there was not only a constant renewal of corroding media due to condensation, but also a further volume of corroding solution which had drained from the upper inner surface. From the above experiment it would appear that the conditions most conducive to corrosion are a constant renewal of the corroding media and the formation of a corrosion product which, if not soluble, is easily removed from the surface.

in the foregoing is given in Table II on page 627.

In addition to the data given in Table II, the most striking feature with reference to the corrosion products was the great difference in the amount of corrosion product formed on the zinc and cadmium-plated specimens in the salt spray. The zinc-plated specimens were covered with a much greater amount of the white corrosion product than the cadmium-plated specimens. These white products upon analysis (see Table II) were found to consist of Zn, Na, Cl, OH, Cd, Na, Cl, OH. These radicles may be combined as zinc chloride and as the double salt $\text{ZnCl}_2 \cdot 2\text{NaCl} \cdot 3\text{H}_2\text{O}$, and as cadmium chloride and its double salt $\text{CdCl}_2 \cdot 2\text{NaCl} \cdot 3\text{H}_2\text{O}$. However, the zinc salts are much more soluble than the corresponding cadmium salts, therefore, it is evident that the corrosion product of the zinc-plated specimen, while probably existing as a chloride in the initial state, hydrolyses, with the formation of an oxychloride, which subsequently becomes converted to hydroxide. This conversion, if it occurs with the corresponding cadmium salts, must take place at a much slower rate than in the case of zinc, thus permitting the initial corrosion products to be washed from the specimen before they are converted into an insoluble adherent product. Upon analysis after the conclusion of a test the salt-spray solution was found to contain the following metals other than sodium: copper, iron, cadmium, zinc.

Sulphuric Acid Spray Results

Upon referring to Table II it will be seen that there was found only a trace of the white corrosion product upon the zinc and cadmium-plated specimens which had been subjected to the sulphuric acid spray.

The initial products of the attack upon the zinc and the cadmium were found to be zinc and cadmium sulphates respectively. There was no evidence to show that they became hydrolysed to the hydroxide, because they were removed from the surface of the specimens and did not accumulate in a sufficient thickness to form an adherent protective coat.

The sulphuric acid spray upon analysis showed the presence of zinc, cadmium, iron and copper. In neither the salt solution nor the sulphuric acid solution was there to be found any trace of nickel or chromium and it was inferred from this that the corroding

TABLE II.—Analysis of
Corrosion Products

Deposit	Nature of Corrosion Product			
	NaCl Spray		H ₂ SO ₄ Spray	
	Ferrous Basis	Non-Ferrous Basis	Ferrous Basis	Non-Ferrous Basis
Cadmium	White. Cd, Na, Cl, OH Rust. Fe	White. Cd, Na, Cl Green. Cu, Na, Cl	White. Trace Cd, SO ₄ Rust. Fe	White. Trace Cd, SO ₄ Green. Cu
Zinc	White. Zn, Na, Cl, OH Rust. Fe	White. Zn, Na, Cl Green. Cu, Na, Cl	White. Trace Zn, SO ₄ Rust. Fe	White. Trace Zn, SO ₄ Green. Cu
Nickel	Rust. Fe	Green. Trace Cu, Na, Cl	Rust. Fe	Green. Trace Cu
Chromium	Rust. Fe	Green. Trace Cu, Na, Cl	Rust. Fe	Green. Trace Cu

On the non-ferrous basis metals deposits of zinc or cadmium afforded little protection to corrosion in either salt or sulphuric acid sprays. On the other hand, both nickel and chromium afforded good protection under both sets of conditions. If anything, the thicker coating of nickel 0.002 in., gave the best protection on the non-ferrous basis metals. On steel it was found that types of protection afforded by the cadmium and the zinc were essentially different from that of nickel and chromium.

Exposed to the sulphuric acid spray the cadmium gave better protection than a zinc coating of the same thickness, but exposed to the chloride spray the thinner coatings of zinc, 0.0001 in., 0.0005 in., and 0.001 in.,

gave better protection than the corresponding cadmium coatings. With the thickest coating, 0.002 in., there was apparently little difference in their protective value.

The chromium deposit in all thicknesses was found to be of no value for the protection of steel in either spray.

With the nickel coatings any permanent degree of protection can only be expected from the thickest deposit, 0.002. The protective value of this thickness was much greater than if the degree of protection was directly proportional to the thickness of the deposit.

Throwing Power in Chromium Plating

ONE of the many problems incident to the application of chromium in electro-plating, particularly of plating irregularly shaped articles, is described and defined in Bureau of Standards Research Paper No. 131, bearing the title "Throwing Power in Chromium Plating," by Messrs. Farber and Blum of the bureau's staff. The authors in discussing this subject state at the outset that while no improvements in throwing power have been brought about in recent years, it was believed that a systematic study of all the factors involved would probably permit the selection of conditions which would at least yield somewhat more uniform metal distribution than is commonly obtained. The quantitative measure of throwing power used is the ratio of the weights of metal deposited on two cathodes, one of which is twice as far from a gauze anode as the other. If, on this basis the metal ratio is greater than 2:1, the throwing power of chromium is negative. For most plating solutions a primary ratio of 5:1 is satisfactory. The effects of the three factors controlling throwing power, namely cathode polarization, conductivity and cathode efficiency are summarized in the paper.

The best throwing power obtained was — 13 per cent. Under less favorable conditions it was — 100 per cent or still poorer. The conditions found to yield the best throwing power are given as (a) a high temperature such as 55 deg. C. (131 deg. Fahr.), (b) a high current density such as 35 amp./dm.² (325 amp. per sq. ft.), (c) a low concentration of chromic acid such as 150 to 250 g/L (20 to 33 oz. per gal.) and (d) a low sulphate

content, for example $\frac{CrO_3}{SO_4} = 200$. These conditions

usually require a potential of more than 6 volts. If this is not available, fair throwing power can be ob-

tained in a more concentrated solution with a lower temperature and current density. With 5 volts a temperature of from 35 deg. to 45 deg. C. (95 deg. to 113 deg. Fahr.) and as high current densities as will produce bright deposits should be used. The actual temperature selected must be maintained within about plus or minus 2 deg. C. (4 deg. Fahr.) to obtain uniform results.

In studying the composition of the plating bath it was found that neither boric acid nor small concentrations of trivalent chromium have any measurable effect on throwing power. Large concentrations of the latter slightly improve it, making it equal to that in a more dilute solution. However, as the trivalent chromium reduces the conductivity of the bath and the plating range, it is not a desirable constituent. The throwing power is much better on highly polished than on dull metal, and is slightly better on steel and brass than on copper and nickel. On sand-blasted metal it is very poor. The covering power as determined with a bent cathode is practically parallel to the measured throwing power.

Tables showing the effect of temperature and current density, the effect of sulphate ratio, that of trivalent chromium, of iron, and of the composition of the base metal on throwing power are given in the paper, together with the results of bent cathode tests.

Reo Super-Tonner

A NEW one-ton truck model, the Super-Tonner, has been announced by the Reo Motor Car Co., Lansing, Mich. It has a wheelbase of 135 in. and is equipped with the new Model C Master Flying Cloud engine. All of the Model FA bodies and the cab are interchangeable on the chassis.

Electro-Magnetic Method of Detecting Cracks Developed for Pro

One of the large bus operators is using replacement parts, and the system works in England. Tests

A METHOD for determining cracks in finished automotive parts has been developed in England. The apparatus used being known as the E. & E. electro-magnetic crack detector. The underlying principle is that a crack in a part of iron or steel changes the magnetic permeability of the part, and if the latter is subjected to a magnetizing force, at the crack some of the magnetic lines pass through the surrounding atmosphere and can be readily detected by suitable means.

The apparatus consists of a magnetizer comprising a coil, core and pole pieces, these latter being so shaped as to be capable of good magnetic contact with the ends of the part to be tested. The magnetizer must be energized by direct current. When current flows through the coil, magnetic lines of force are created in the core, and these pass through one of the pole pieces into the part to be tested and return through the other pole piece to the core. A crack anywhere in the magnetic path considerably increases the resistance to the flow of magnetism. Some of the lines, of course, will pass

magnetic force in accordance with the size and magnetic permeability of the part being tested, for if the steel is super-saturated some magnetism is crowded out into the atmosphere even where there is no defect, which may lead to false readings. On the other hand, if the part is insufficiently magnetized, the lines crowded out at the crack will pass through the remaining sound section of the part and there will be practically no magnetic effect outside the part. The magnetic conductivity of the part under test must also be considered, especially in the case of alloy steels and materials of low magnetic permeability, as the magnetizing force to be applied varies with this.

In order to vary the magnetization in accordance with requirements, the current flowing through the coil is regulated, and in some cases specially designed magnetizers with flux diverters are employed. In the cases of certain parts it is necessary to make a special study of stress distribution in them so as to know where cracks may be expected.

Control of the magnetizing current is effected by the potentiometer method. The system of connections used is such that when the control handle of the potentiometer is in the zero position no current flows through the coil and therefore no magnetism is induced in the part under test. As the control handle is moved away from the zero position the current flow increases stepwise, and when a suitable intensity is reached the test is made. The control handle is then brought back to zero, but since this leaves a certain amount of permanent magnetism in the piece, which is detrimental under some conditions, the handle is moved beyond the zero point to apply a demagnetizing current. Demagnetization of the parts tested has been found particularly neces-

sary in the case of axles and shafts, as in many cases the remnant magnetism is sufficient to attract iron dust, to the detriment of the bearing surfaces. The potentiometer also serves as a discharge resistance for the coil in case the supply should happen to be turned off while a test is being made.

It appears that so far the method has been applied mostly to railway equipment, but at least one large bus-operating company in England is using it in connection with its replacement parts. Such parts as front-axle centers, steering knuckles, crankshafts, rear axle driveshafts and steering arms are tested in this way.

For most of the parts the magnetizers have to be made special. The manufacturing company (Equipment & Engineering Co., Ltd., London, WC-2, 2-3 Norfolk St., Strand) furnish magnetizers with blank pole pieces

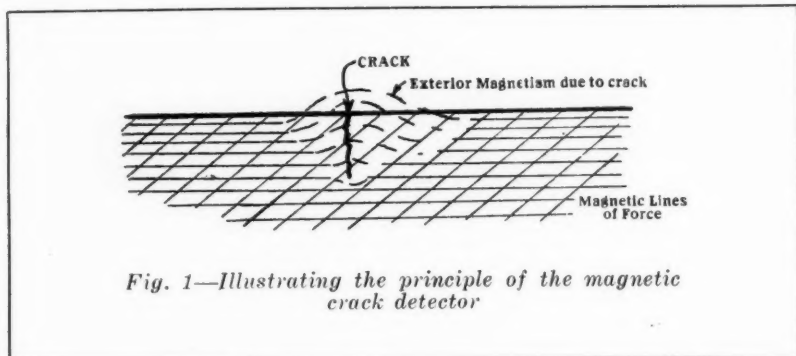


Fig. 1—Illustrating the principle of the magnetic crack detector

straight across the gap at the crack, but not as many as would flow through this section if there were no crack. More lines of force then pass through the sound section of the part, and some jump the gap on the outside of the part, passing through the air surrounding it.

These magnetic lines of force jumping a surface crack are detected by what is known as a detecting ink. This ink contains very fine iron filings, which latter, by the magnetic effect on them, are drawn into the most intensive magnetic field outside the piece under test, that is, directly across the crack, and whenever a crack exists a black line is formed along the length thereof by the testing ink. The deeper the crack the greater the number of magnetic lines that are forced out into the air, and the broader will be the black line of detecting ink.

It has been found that it is necessary to control the

Cracks in Steel or Iron Parts duction Use in *England*

*the equipment for inspection of its
tem has been applied to railway
simple and easy to apply.*

which can be machined by the user to fit the part to be tested. In the case of crankshafts, a half-round groove across the pole pieces to fit the turned shaft is all that is necessary.

One type of magnetizer has movable pole pieces, so that the centers can be adjusted for large or small parts. This has a single long magnetizing coil which is sectionally wound and inclosed in a tubular sheathing. Above it there is a brass drip tray which catches the surplus detecting ink when the part under test is being "basted." When small parts are being tested they are being turned around in different directions, so the magnetic flux will pass through every part.

The amount of energy consumed is 150 watts for the smaller sizes, and proportionately more for the larger ones. Current can be obtained from the lighting circuits if these carry direct current; in the alternate case the use of a Westinghouse rectifier of the dry type is being recommended. The magnetizer can be wound also for operation on automobile-type storage batteries or small rotary converters.

The operations involved in the test are said to be exceedingly simple and easy to learn, after the proper degree of magnetization for any particular part has once been determined. The uniform and dependable results claimed to be obtained are said to be in large measure due to the detecting ink used. At first considerable difficulty was experienced from the iron filing

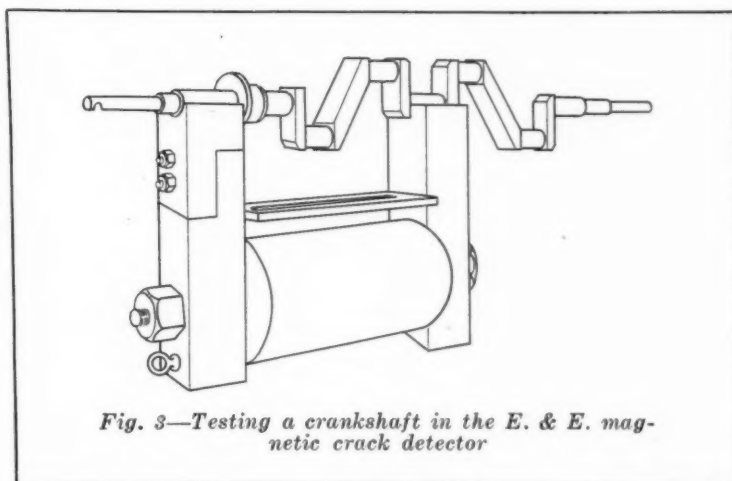


Fig. 3—Testing a crankshaft in the E. & E. magnetic crack detector

particles becoming magnetized on first use. The production of an iron of a high state of purity and which retains practically no magnetism when the magnetizing force is removed, solved the problem. These filings, which are now produced industrially, are suspended in a hydrocarbon liquid which excludes all moisture and therefore prevents rusting.

Certification Plan

MISCELLANEOUS Publication No. 105, issued by the U. S. Department of Commerce, describes a novel "certification plan" whereby manufacturers supplying commodities covered by standard specifications prepared by the U. S. Department of Commerce in co-operation with industry guarantee compliance with these specifications.

"The so-called 'certification plan' involves the compilation and distribution of lists of manufacturers desirous of obtaining contracts based upon certain selected nationally recognized specifications, and willing, when requested to do so, to certify to the purchaser that the commodities delivered are guaranteed to comply with the requirements and tests of the specifications.

"The lists of manufacturers willing to certify to compliance with certain selected Federal specifications are contained in a Bureau of Standards Letter Circular No. 256 entitled 'Sources of Supply of Commodities Covered by United States Government Master Specifications.' This circular is not published; its distribution is limited to governmental and institutional purchasers."

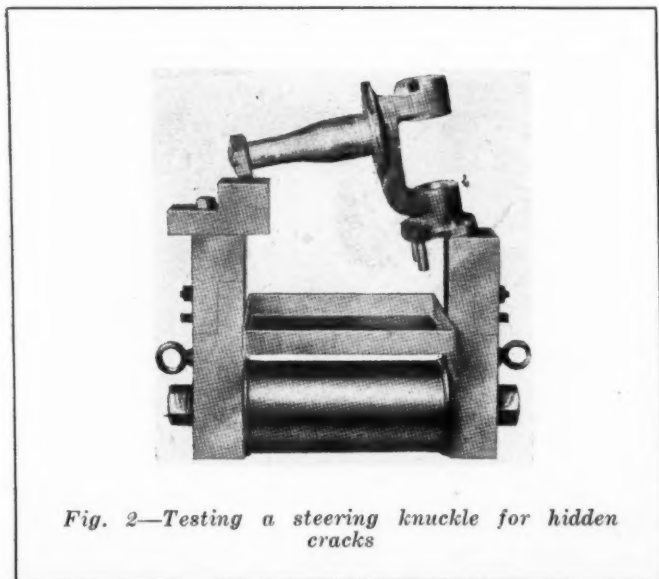
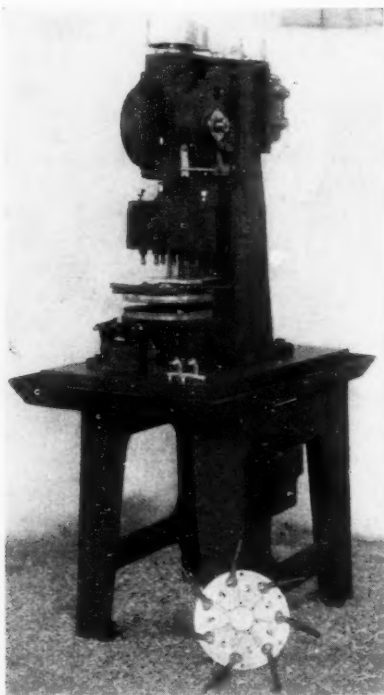


Fig. 2—Testing a steering knuckle for hidden cracks

NEW DEVELOPMENTS—Automotive

Upright Drilling Machine

A SPECIAL drilling machine made up from standard units recently built by the Langelier Manufacturing Co., Providence, R. I., is designed for semi-automatic drilling and reaming of two $\frac{1}{8}$ -in. holes spaced $\frac{3}{8}$ in. apart in two types of die-forged brass ball float levers. The output for each type is 10 completely drilled and reamed levers per minute.



Langelier semi-automatic upright drilling machine

This machine consists of a standard No. 21 automatic drilling unit mounted vertically on an upright column that is bolted to the planed top surface of the horizontal table. It is equipped with a drilling and reaming head of 8 spindles, 4 spindles for each type of lever and is used in conjunction with a seven-station automatically-operated circular indexing dial also bolted to the table. The dial is operated by a face cam operating through levers and a connecting rod to a pawl and ratchet

wheel on the indexing fixture. A positive lock is also provided for accurately locating and holding the dial in position.

The indexing-fixture has two separate interchangeable dial plates, one for each type of lever. Each dial plate is fitted with seven hand clamping levers, Vee blocks and stop blocks for locating and holding the work. A stationary drill guide plate is used for accurately starting the drills. The machine can be either run continuously or to start and stop at each drilling cycle. In addition, it is provided with a feed cam that gives the drills a fast advance to the work, a drilling feed and a fast return.

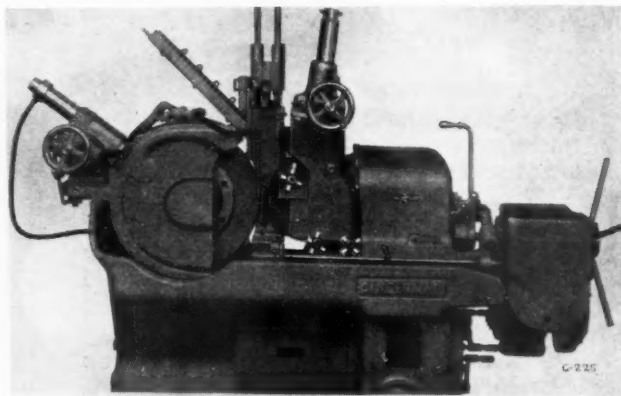
The drilling unit is belt-driven by a $1\frac{1}{2}$ hp. motor attached at the rear of the column. Floor space required is 28 in. x 44 in. Total weight about 1800 lb.

Grinding Universal Knuckles

BY means of a hydraulic loading and unloading fixture on a Cincinnati No. 2 Centerless Grinder, two arms of spiders for universal joints and differentials are ground simultaneously. The work is placed in an inclined chute and all succeeding operations are automatic. As the elevator part of the fixture rises, one piece of work is released from the chute, passes by gravity onto the work-carrying fingers and is lowered by action of

the hydraulic cylinder on a slotted work support blade. The automatic in-feed attachment brings the regulating wheel forward and two arms of the spider are ground. As the regulating wheel backs away, fingers carry the piece upward where it is ejected into the receiving chute over the regulating wheel.

A duplex grinding and regulating wheel arrangement



Cincinnati centerless grinder

is used—the spacer between the wheels allowing the rotation of the two arms not being ground.

Two grinding cuts are taken on these arms, the first being 0.008 in. and the finishing cut 0.002 in. Production totals 170 pieces per hour, grinding four arms complete.

Grinding and Lapping Unit

ROUGHING, finishing and lapping of cemented-tungsten-carbide tools may be accomplished by the fixed method on the No. 2H- $1\frac{1}{2}$ combination machine just announced by the Advance Diamond Tool Co., Detroit, Mich. This machine is provided with two universal vises, one diamond lapping disk, one cast-iron disk mounted with a 12-in. roughing wheel and one cast-iron disk mounted with an 8-in. finishing wheel.

Both ends of this machine are provided with slides parallel to the faces of the wheels, each slide having a cross-slide for moving the universal vise in and out. The tool to be ground is put in the universal vise and the angles are adjusted to the requirements. Grinding is then accomplished by moving the slide across the face of the ring-type roughing wheel and then moving across to the finishing wheel. Should diamond lapping be required



Advance Diamond combination grinding and lapping machine

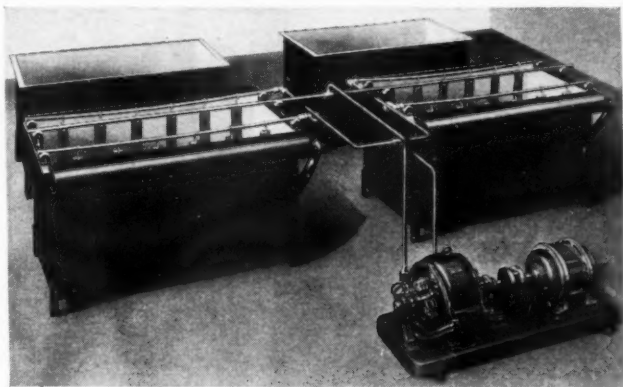
Parts, Accessories and Production Tools

on the same tool, the light cross-slide and universal vise with the tool mounted thereon may be quickly removed and placed on the slide adjacent to the lapping disk. The tool remains set up to the proper angle throughout the grinding and lapping operations.

Either direct or Tex-Rope drive can be supplied. The floor space required is 30 in. x 50 in. Approximate net weight 1300 lb.

Bullard-Dunn Metal Cleaning

DROP-FORGINGS, stampings, stainless steel parts, and other parts prepared for plating and finishing operations may be cleaned by the Bullard-Dunn process now being offered to industry on a license basis by the Bullard Company, Bridgeport, Conn. In this process, the metal surface is cleaned by the action of hydrogen



Bullard-Dunn metal cleaning unit

electrically generated at the cathode in an aqueous solution and, as it is cleaned of scale and foreign matter, it is said to be simultaneously protected from pitting, etching and hydrogen embrittlement by the deposit of a homogeneous metal coating thereon. Another feature is the ability to clean recessed and otherwise inaccessible surfaces. It is claimed that the metal deposit resulting from this process acts as a good base for electro-plating operations; also as a lubricant in deep drawing operations. Chromic oxide coatings or inclusions, occurring in stainless steel fabrication, are said to be entirely removed.

The equipment required for this new cleaning process consists essentially of the following items: 1—A source of low-voltage direct electric current; 2—A tank, or a series of tanks or cells, properly equipped with steam, water and electrical connections, as required; 3—A ventilating system for the removal of gases and fumes developed in the use of the process.

Fog Penetrator

A DEVICE intended to disperse fog sufficiently to enable vehicle drivers to see their way for some distance ahead is being developed by Sphinx Electric, Ltd. The idea was suggested by the fact that when a brazier is lighted during foggy weather an area of clear air surrounds the fire, caused by the drying of the

atmosphere. The "Fog-gon" operates on the same principle. It emits a stream of hot air before the vehicle to which it is fitted, and a lamp may be so incorporated as to intensify the clear air beam. The heat is produced electrically and the air stream by a motor-driven fan.

Inverted Type U-Tube Manometer

MOST of us are familiar with the ordinary type of U-tube manometer in which the bend of the glass tube is at the bottom. The inverted type is less often seen, although it possesses decided advantages for certain classes of work, especially in connection with the measurement of pressure differences in hydraulic systems and of the rate of flow of fluids.

An inverted type of manometer now is manufactured by the Merriam Co. of Cleveland, Ohio. It differs little from the conventional U-tube manometer, except that the bend of the U-tube is at the top instead of at the bottom. It is connected in the usual manner, one arm of the U-tube being piped to each of the two points between which the pressure difference is to be measured; or, if the rate of flow of the liquid is to be determined, the two ends of the tube are connected to opposite sides of an orifice disk inserted in the pipe line, through which the liquid flows.

The chief difference between the ordinary and the inverted type of U-tube manometer is that whereas in the former the difference in levels observed is that of mercury contained in the tube, in the latter it is that of columns of the fluid whose pressure or rate of flow is to be measured. The chief advantage of this method is that should the differential pressure become excessive, no mercury will be lost; all that will happen is that some of the liquid from one side of the tube will flow over to the other side.



Merriam inverted U-tube manometer

Pumpability of Lubricating Oils

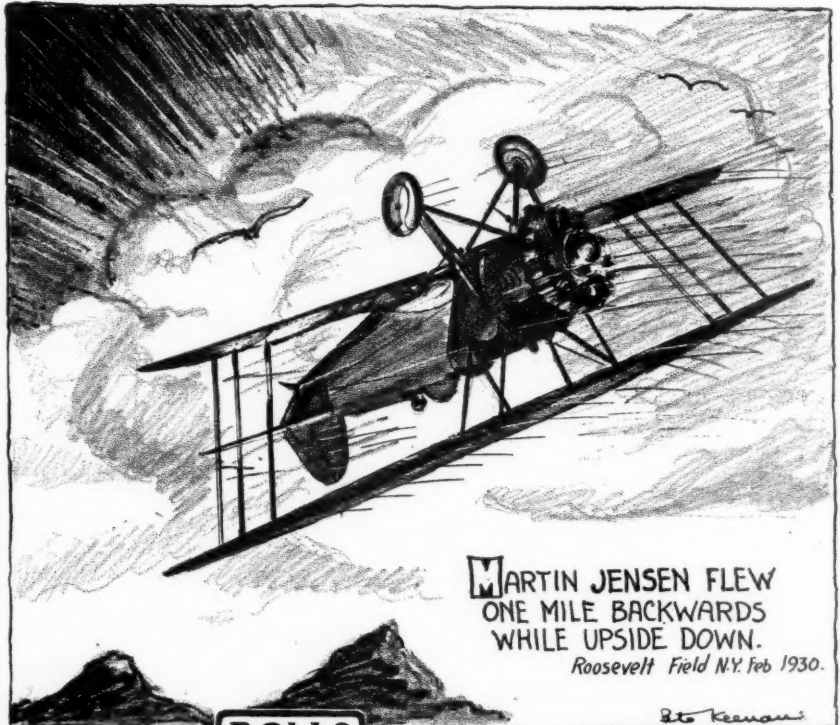
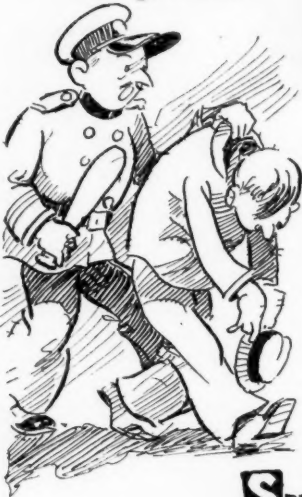
PUMPING tests have been made on 20 samples of lubricating oils by the Materials Branch of the Air Corps, these same oils having previously been tested for shear. The purpose was to determine the relationship, if any, between the viscosity curve and the pour point as determined by the usual laboratory methods, and "pumpability" at low temperatures. The following conclusions were drawn from the results obtained:

1. The oils which show low shear resistance (low starting torque) also show good flow through a gear pump. A flat-viscosity-curve oil is therefore to be desired for winter use.
2. From a comparison of Saybolt viscosity ratios at two or more laboratory test temperatures, the comparative action of oils at lower temperatures may be predicted.
3. The A.S.T.M. pour test is of value only in comparing oils known to have similar viscosity characteristics.
4. Flow of oil at low temperatures is only very slightly affected by a change in the speed of the pump between 300 and 1000 revolutions per minute.

Automotive Oddities

by Pete Keenan

CHAS W. LLOYD
OBTAINED SIXTEEN
LOANS ON THE SAME
CAR, TOTALING
\$42,000.00
Los Angeles 1930.



MARTIN JENSEN FLEW
ONE MILE BACKWARDS
WHILE UPSIDE DOWN.
Roosevelt Field N.Y. Feb 1930.

Pete Keenan

SERIAL NUMBERS ON
ROLLS-ROYCE CARS ARE A
FACTORY SECRET AND NEVER
DISCLOSED TO THE PUBLIC.



THIS 30-
YEAR OLD
PIERCE ARROW RECENTLY WON A PRIZE OF
\$1000.00 FOR TRAVELLING ON ITS OWN POWER.

AUTOMOBILE
CLIMBS TREE.
SKIDDED ON ICY ROAD,
LEAPED 30 FEET,
AND LANDED ON
TREE

Conneaut, O. 1930.



News of the Industry

PAGE 633

VOLUME 62

Philadelphia, Saturday, April 19, 1930

NUMBER 16

French Tariff Bill Drastic in Content

Measure Seen as Retaliation
for Proposed American
Schedules

NEW YORK, April 17—It took the French Chamber of Deputies just 45 minutes to tell the world what it thinks of the Hawley-Smoot tariff schedules, now in committee in the House of Representatives. By voting, 475 to 2, the Chamber passed the weight duty measure April 15, increasing present tariffs on automobiles, trucks and parts from 45 per cent to an average of about 60 per cent, and sent it to President Doumergue. It is reasonable to expect that the measure will be signed immediately.

America's example to Europe, and the rest of the world, in matters of tariff have been the cause of considerable comment in the past. But in the face of changing economic conditions in the past few years, important automotive executives think it probable that American industry generally will appreciate that our thinking on tariffs needs some overhauling. Certainly the automobile industry has never encouraged protective tariffs for itself. Automotive men have sought and found protection to the industry in manufacturing and distribution efficiency, rather than taking their case to Congress for adjudication and dragging politics into the industry.

Specifically, this French blow to the automobile business is believed to have been struck largely because of the sentiment created as a result of our threat to increase the duty on French lace 300 per cent, bringing it to approximately 200 per cent, ad valorem. There has been some discussion in French journals about protecting the automobile industry there, but that, as an academic topic for debate, carried less weight until there was reason for some retaliatory measure.

Most important to the industry and to American business as a whole, is the fact that United States exports, including Canadian assemblies, foreign assemblies and manufacture in foreign countries, amount to about 18 per cent of the volume of the industry. And, if there were some trend toward lowering the price of American automobiles sold in foreign countries, instead of increas-

(Continued on page 636)

—Reo—

Builds Model Showroom

LANSING, April 14—A new model sales display building, the first of its kind to be established by the Reo Motor Car Co., is under construction in Lansing, the company's headquarters, and will be completed by June 15, according to an announcement by E. G. Poxson, Reo's newly appointed sales manager. The new quarters will be built for the Reo Michigan Sales, Inc., a factory subsidiary which controls both retail and wholesale distribution of Reo products in Lansing and surrounding territory.

Hayes Workers Strike Affects Peerless, Marmon

INDIANAPOLIS, April 15—More than 1100 employees of the Hayes Body Co. here were idle today as the result of a strike on the part of 200 metal finishers and door hangers. The remainder of the force either walked out with the strikers or were dismissed at the close of work Tuesday, as production was impossible.

The Marmon Motor Car Co. of Indianapolis and the Peerless Motor Car Co. of Cleveland are dependent on Hayes for bodies. The workers charge that some of the door hangers under present working scales could not make more than \$2.75 a day and asked that a dollar an hour be established as the new price.

E. J. Connolly, vice-president of the Hayes Co., could not be reached today and sub-officials refused to comment on the trouble other than to say they regarded the strike as the work of agitators. However, workers said that peace overtures had been made with no results. Other arbitrations are scheduled to take place later in the current week.

Hupp Earnings Reduced

DETROIT, April 16—Hupp Motor Car Corp. has reported for the quarter ended March 31, 1930, a net profit of \$66,749, after all charges and taxes, equal to 4 cents a share on 1,512,099 shares on \$10 par common stock. This compares with net profit of \$1,501,595, or \$1.10 a share on 1,362,498 shares, in first quarter last year.

New Interests Take Possession of Moon

A. M. Andrews Group Elects
Muller President at
Meeting

ST. LOUIS, April 14—The New Era interests in the Moon Motor Car Co. held a special directors' meeting here April 12, ousted the old officers and selected their successors to take office immediately.

New officers were chosen as follows: W. J. Muller, president; J. E. Roberts, second vice-president; R. P. Kolwitz, secretary; Helm Walker, vice-president, and F. E. Welch, treasurer.

Mr. Muller, called the "father of the Ruxton car," is vice-president in charge of designing for the New Era company, and designed the Ruxton. Under his administration, it is anticipated production of the Ruxton will be pushed.

S. Mayner Wallace of St. Louis, counsel for the Muller-Welch interests, said the old officers and directors did not appear at yesterday's meeting, and that his clients controlled 239,400 shares of the total of 350,000 Moon shares outstanding.

The Moon Company had seven directors until two weeks ago, when the new Era interests called a special stockholders meeting—not recognized as valid by the old regime—and elected eight more directors, who thereupon authorized yesterday's meeting.

Old officers of the firm were: Carl W. Burst, president; Helm Walker, vice-president; W. D. Semenway, vice-president; Stanley Moon, secretary, and H. W. Klemme, treasurer.

The Moon Motor Car Co. a pioneer in the automotive industry, grew out of the Moon Brothers Carriage Company, which made carriages for years, before the first automobile was built. Joseph W. Moon, who had been president of the older company, became head of the new venture. At his death, in 1919, he was succeeded by Stewart McDonald, under whose presidency the company attained a peak production of 12,964 cars, in 1925. McDonald was succeeded in 1928 by Burst, who had been with the company since 1909, serving as factory manager and in other capacities. Treasurer Klemme had been with the company since it made buggies. Stanley Moon, son of the founder of the company, had been secretary.

Seiler Expects Biggest Year for Coach Sales

General Motors Truck Orders at Peak, He Says

DETROIT, April 14—"Our business not only 'looks good' but it actually is good," said Paul W. Seiler, president and general manager of the General Motors Truck Co., last week upon his return from a complete circuit of the United States covering several thousand miles.

"I talked with practically every one of our branch managers and distributors and frankly I have never seen them more enthusiastic," Mr. Seiler said. "It isn't merely an optimism based on hopes either. I found that our stocks in the field on the first of April were just about two-thirds of the total trucks on hand at the same time last year. This includes not only stocks of our branches and distributors but our dealers as well. Retail deliveries showed a decided increase during the past ten days as compared with the same period in 1929 and the increase seems destined to continue steadily through the spring selling season.

"Unfilled retail orders on hand during the past few days have averaged 59 per cent greater than for the similar period last year and our shipments at present are just about keeping pace with our incoming orders."

Mr. Seiler added that his company's unfilled coach orders and sales to date for the year were the highest since General Motors Truck entered that business, and that 1930 undoubtedly will be the company's biggest coach sales year. He expressed enthusiasm, also, over the outlook for his company's cab business.

Paris Show Entries Closed

PARIS, April 9—Applications for space in the Paris automobile salon, to be held in the Grand Palais from Oct. 2 to 12, closed last week with practically the same number as last year. While most of the American firms doing business in France applied for space, General Motors has abstained, and it is believed will hold an independent show in some central part of Paris while the international show is in progress.

Fairchild Sales Increase

NEW YORK, April 16—Gross sales of the Fairchild Aviation Corporation's American subsidiaries increased from \$2,656,000 in 1928 to \$3,494,000 in 1929, or \$838,000. These figures were disclosed last week by Sherman M. Fairchild, chairman of the board of the company. Fairchild is a division of The Aviation Corporation.

New England Section Nominates

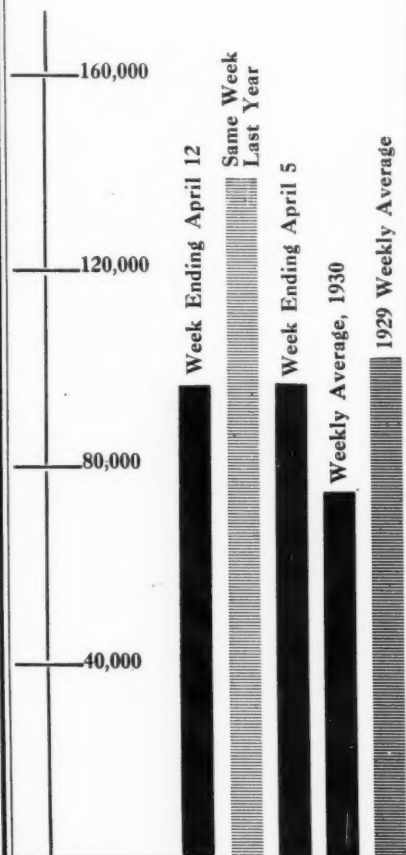
BOSTON, April 14—George A. Round, of the Vacuum Oil Co., New York and Robert S. Dynes, of the Pennsylvania Petroleum Products Co., Providence, R. I., were the speakers at the April meeting of the New England Section, S.A.E., here this week. The meeting was one on lubrication.

President W. H. Clarke announced that the nominating committee had reported that the slate presented for the 1930-31 officers were Albert Lodge, Mohawk-Chevrolet Co., Greenfield, chairman; Lewis W. Martin, United Motors Service, vice-chairman; Victor Ogilvie, Massachusetts Automobile Club, treasurer; H. B. Hawks, Valvoline Oil Co., secretary. They will be elected at the May meeting.

Franklin Sets Sales Record

SYRACUSE, April 14—Although 1929 was record-breaking year for the Franklin Automobile Company, retail deliveries of Franklin cars for the first quarter of the current year were the largest in the history of the company, President H. H. Franklin said here. Retail deliveries the first quarter were 2503, compared with 2302 in the largest previous quarter.

Automotive Industries
Production Chart
Weekly



The composite chart appearing above will delineate each week production of passenger cars in the United States and Canada, for the week preceding publication of the issue in which it appears, together with production for the preceding week, and other factors. Data used in compiling it are obtained in confidence from a number of sources. Other factors may be added, dependent upon the cooperation of additional sources of information.

Parts Jobber is Fitted for Airplane Service

Heavy Investment in Stocks Not Yet Justified, is View

DETROIT, April 14—Taking advantage of an opportunity to combine a visit to the All-American Aircraft Show in Detroit with a business meeting, the Aeronautical Committee of the National Standard Parts Association met at N.S.P.A. headquarters on April 9, under the chairmanship of E. A. Watkins of the Watkins Manufacturing Co., Wichita, Kansas.

With the information before them that already approximately 40 per cent of the manufacturer members of the N.S.P.A. are producing parts, tools or material used as original or replacement equipment or in the maintenance of airplanes, the attention of the committee was devoted largely to the possible place for the already established automotive parts jobber as a wholesaler to the aviation industry.

Discussion brought out the opinion that present established jobbers of automotive parts are particularly well fitted in many cases to take on this new line. This opinion, however, was supplemented by the thought that at the present time there is not yet available a sufficient volume of business in replacement engine parts to warrant investment in a stock of them by the average automotive parts jobber.

On the other hand, shop tools and equipment for servicing the automobile motor are largely the same as those needed for servicing aviation engines and the automotive parts jobber is in an excellent position to handle airport service station requirements along this line, according to the committee.

Containers to be Tested

PARIS, April 14—An international competition in which prizes are to be awarded for the most efficient designs of containers for transportation of goods by sea, rail and road has been organized by the International Chamber of Commerce, Paris. Each competitor must submit two models, one open and one closed, with three containers of different sizes for each of the two types. The jury will take into account such features as lightness of weight, cost of manufacture, upkeep charges, handling facilities, methods of fixing to railroad freight cars or motor trucks, and the best method of closing.

Cadillac Makes First 1000 V-16's

DETROIT, April 14—Cadillac Motor Car Co. has established production records for the fine car field by shipping the one thousandth 16-cylinder Cadillac at 2 P. M. April 11 to the Uppercu Cadillac Corp., New York distributors. Present production schedules represent the fourth increase in 30 days, and orders are being received at a rate which will require several months before production can meet demand.

Nash Elects McCarty at Directors' Meeting

Dividend of \$1.50 Per Share
Follows Earnings

KENOSHA, WIS., April 14—At a directors' meeting of the Nash Motors Co. held last week at Kenosha, a dividend of \$1.50 per share was declared payable on May 1 to stockholders of record at the close of business April 21.

The balance sheet and earnings statement for the first quarter, which included December, 1929, and January and February, 1930, disclosed that the company earned \$1,782,512.03 after all expenses of manufacturing, including depreciation, selling and administration, and providing for both state and Federal taxes.

Commenting upon the action of the board in declaring the dividend, President C. W. Nash stated that the company over a period of years had been accumulating a large cash surplus to take care of dividends at just such times as we are now passing through. He stated that this accumulation of cash surplus rightly belonged to the stockholders and in his judgment this was the proper time to distribute a little of it to them.

E. H. McCarty was elected vice-president, general manager and director of the company. Mr. McCarty is a nationally known figure in the automobile business. He retired from active business about one year ago. He now returns to the company to become prominent in its general affairs.

Automotive Brevities

O. D. Tucker & Co., Little Rock, Ark., operating branches in nine southwestern cities, has recently been appointed distributor for the Union Chain & Mfg. Co., Sandusky, Ohio.

Swartz Mfg. Co., Freeport, Ill., will be merged with the Stover Mfg. & Engine Co., and its physical outfit will be transferred to the plant of the Stover Co. Carl H. Swartz, president and treasurer of the Swartz Mfg. Co., becomes a director of the Stover organization.

Frank D. Hourigan, formerly on the sales staff of the Bendix Brake Co., South Bend, Ind., has been promoted to the position of assistant to the director of sales of the company.

Harry E. Penfield has been elected president of the Standard Screw Co., to succeed Philip B. Gale, who has been elected chairman of the board. Mr. Penfield has been vice-president of the company for a number of years. W. E. Corlett was elected a vice-president and T. H. Sterling was reelected secretary and treasurer. C. A. Post remains as assistant treasurer.

Climax Molybdenum Co. announces the removal of its offices on May 1 from 61 Broadway to 295 Madison Ave., New York City.

Dodge Bros. half-ton trucks will be equipped with heavier tires on a standard chassis, according to an announcement from the company.

Young Radiator Co. reports receipt of a large order for Marine engine oil coolers from the Lycoming Mfg. Co., Williamsport, Pa.

Ford Motor Co. will open its new branch assembly plant at Long Beach, Cal., April 18. The Long Beach plant supplants the branch plant in Los Angeles.

Stearns-Knight motor cars are being offered at a discount by the Stearns-Knight Sales Corp. of New York. The advertising offering these cars says that they are 1929 and 1930 new cars.

Returns to Nash



E. H. McCarty

whose return to the Nash fold was
signaled this week by his election as
vice-president, general manager, and
a director of the company

Cleveland New Wrought Products Co., Cleveland, has been merged with the Chicago Mfg. Co., and the corporate name of the consolidation will be United Screw & Bolt Corp., of which the merging companies will operate as separate divisions.

American Forging & Socket Co., Pontiac, Mich., manufacturers of automobile body hardware has opened a Chicago sales office at 608 S. Dearborn St., in charge of H. B. Halliday.

Leeds & Northrup Co., Philadelphia, announces that the new address of its Cleveland office is 1941 Union Press Bldg.

Manning, Maxwell & Moore, Inc., New York, announces that T. M. Reese has joined its staff and been appointed manager of the Pittsburgh district in charge of sales of Putnam machine tools and Shaw electric cranes.

Handy Governor Corp. has announced that it has closed contact with the International Harvester Co. and Mack Trucks, Inc., under which Handy governors will be standard equipment on Mack and International motor trucks.

Reading Chain & Block Corp., Reading, Pa., has appointed R. G. Elliott, 631 Chapel St., New Haven Conn., to handle its line throughout the state.

Dodge Bros. Chicago district office has been removed from the People's Gas Bld. to Room 556 Rigley Bldg., 410 N. Michigan Ave.

Black & Decker Mfg. Co., Towson, Md., employees have formed the Hexagon Glider Club and will engage in extensive ground school work using a non-flying glider.

Chain Belt Co., Milwaukee, Wis., has appointed the R. B. Everett Co., Houston, Tex., and the J. D. Adams Mfg. Co., Indianapolis, Ind., distributors for construction equipment division.

Wheels, Inc., 835 Eleventh Ave., New York City, N. Y., representing several of the principal Motor Car Wheel Manufacturers in the Eastern Territory, has just completed arrangements with Loomis-Root, Inc., Buffalo, N. Y., to represent them in the East.

Lincoln Electric Co., Cleveland, announced the opening of new offices in Saginaw, Mich.; Fort Wayne, Ind., and Oil City, Pa.

Kelsey-Hayes Wheel Corp. has declared regular quarterly dividend of \$1.75 on preferred, payable May 1 to stockholders of record April 21.

Warner Gear Schedules Gain

CHICAGO, April 14—April shipping schedules of the Warner Gear Company, subsidiary of Borg-Warner Corporation, are 10 per cent larger than shipments in April, 1929, C. S. Davis, president of Borg-Warner, said today.

Rubber Interests' Merger Avoided by Principals

Grouping of Three Big Companies
Seen as Unlikely

AKRON, OHIO, April 15—Consolidation of Goodyear Tire and Rubber Co. with either the United States or Seiberling Rubber companies is considered only a remote possibility by those in close touch with the internal affairs of the companies. Observers of conditions in the rubber field today are confident that the near future holds no merger possibilities despite constant and insistent rumors to the contrary.

Cyrus S. Eaton, Cleveland financier, who, with Otis & Co., of New York, holds control of Goodyear, is said to be against any move which will bring into Goodyear any smaller and financially weaker firms. That affiliation with these companies would weaken Goodyear's dominant position in the rubber industry, is said to be the stand taken by the Eaton Otis group.

Earnings of the Seiberling Co. founded after the reorganization of Goodyear, have been reduced from \$5.37 in 1925 to one cent a share in 1929 on 267,000 of common stock outstanding. The April dividend on the preferred stock was omitted this year. The United States Rubber Co. has not paid a dividend on its common stock since 1921, and the last two per cent preferred payment was made in 1928. This company has 15,454,959 shares of common stock outstanding. Stockholders of the United States Rubber Co. were told that the company was planning no merger, and that the refunding program was assured in replies to questions put to the board of directors at the annual meeting Tuesday.

F. P. Davis, Jr., vice-president, discussing the merger, said, "We can see no present advantage in a consolidation with any other rubber company, and our efforts are being devoted to putting our own house in order."

Regarding the refunding program: William De Kraft, chairman of the Finance Committee, said that although no definite plans had been formed for the refunding of \$18,336,000 of 7½ per cent notes due August 1, there had been definite assurance that the company will be able to meet the notes.

Perfect Circle Sales Gain

HAGERSTOWN, IND., April 15—March proved to be the best month of 1930 on the sale of Perfect Circle piston rings, according to a statement just made public by C. N. Teetor, president and general manager of the company. Sales for March increased 22.78 per cent over February, while February showed an increase of over 25 per cent over January.

Quebec to Improve Roads

MONTREAL, April 14—Over \$11,000,000 will be spent by the Roads Department this season for the construction, maintenance, paving and repairing of the highways in the Province of Quebec.

Mill Competition Results in Concessions on Steel

Wide Sheets Lower in Price,
Output Steps Up

NEW YORK, April 17—Mahoning Valley sheet mills were able to step-up their operating schedules another notch this week. Tonnage business continues to come largely from the leaders in the low-priced motor car field, but in spite of the piecemeal character of buying by other automotive consumers, their purchases in the aggregate denote moderate improvement. As the result of more mills competing for wide sheet business, extras for widths have been definitely lowered, reductions ranging from \$12 per ton on 17 and 18 gage, 70 to 72 in. wide, down to \$1 a ton on 10 to 16 gage, 66 to 68 in. wide sheets. Extras on 40 to 44 in. wide sheets remain unchanged.

The 3.80 cents base price for full-finished automobile sheets remains unaltered with the market rather firm. Black and blue annealed sheets are fairly steady. In the Chicago market the leading independent quotes black sheets, at 2.75 cents, mill, but other producers are said to be shading that price to the extent of \$1 to \$2 per ton. A slightly firmer tone is noted in the market for hot-rolled strip steel with 1.80 cents, Pittsburgh, the inside price for 6-in. and under and 1.70 cents for over 6-in. to 24-in. widths. The margin of non-integrated strip mills for conversion has become so scant that there is much pressure on the market for semi-finished steel.

Cold-rolled strip continues to be quoted at from 2.55 cents, Pittsburgh, upwards. The steel bar market is unchanged. Demand for automotive alloy steels, considering market conditions as a whole, is encouraging. Bolt and nut prices are unchanged.

Pig Iron—The market is rather quiet, demand from automotive foundries being chiefly for single carload lots and prompt shipment. Prices are unchanged.

Aluminum—Routine conditions prevail. Automotive consumers are buying foundry metal as they need it. No change is noted in quotations.

Copper—Following announcement that the Copper Export Association had recommended to its foreign members a reduction in price by 4 cents, the domestic market was quoted at 14 cents. The American Bureau of Metal Statistics announced that stocks on hand on April 1 totaled 256,920 tons, the heaviest accumulation in nine years. The price cut was a direct result of this statistical disclosure.

Tin—A meeting of the Tin Producers' Association was held in London yesterday (April 16), for the purpose of more efficient control of output. The market opened the week very quiet, with spot Straits quoted at 36½ cents.

Dawson Signs With Chevrolet

DETROIT, April 14—Hanley Dawson, for more than 20 years a retail automobile dealer in Detroit, and who is credited with selling more automobiles than any other Detroit dealer, has signed a Chevrolet contract, according to an announcement from H. B. Hatch, Chevrolet zone manager.

Financial Notes

Mengel Co., Louisville, balance sheet made public, showed gross sales of \$18,373,493 last year and net profit of \$1,248,172, after payment of all charges, estimated Federal taxes, etc. Surplus account was increased to \$2,658,359. Current assets on Dec. 31, were \$7,605,334, including \$772,712 in cash, and current liabilities were \$700,000. Total assets were given at \$18,332,921. The annual meeting of stockholders is set for May 8.

Yellow Truck & Coach Mfg. Co. consolidated net income for the year ended Dec. 31, 1929, after all charges and adjustments applicable to prior years, amounted to \$1,927,966, as compared with a net loss of \$1,104,411 for the preceding year. Of the 1929 income, \$513,003 was earned by the Yellow Mfg. Acceptance Corp.

Michigan Steel Corp. Ecorse, Mich., has declared an extra dividend of one per cent in stock payable July 21 to stockholders of record June 30. This action follows the recent approval by the stockholders of an increase of the authorized capital stock of the company from 220,000 to 300,000 shares without par value.

Briggs Mfg. Co. reports for the year ended Dec. 31, 1929, a net profit of \$2,426,609, after all charges including Federal taxes, compared with a net profit of \$4,313,282 in 1928. The 1929 profit is equal to \$1.21 a share on 2,003,225 shares of no par stock and compares with \$2.15 a share in 1928.

Winton Engine Co. directors declared the regular quarterly dividend of 75 cents a share on the preference stock and \$1 a share on the common stock payable June 1 to stockholders of record May 30.

Packard Motor Car Co. has declared regular quarterly dividend of 25 cents, payable June 12 to stockholders of record May 15.

Eckman Delivers Paper

BETHLEHEM, PA., April 16—"Electrical Resistance Flash Welding" was the title of a paper delivered before engineering sections of Lehigh University here on April 11, by M. L. Eckman, general manager of the Taylor Winfield Corp., Warren, Ohio.

French Tariff Bill Drastic in Content

(Continued from page 633)

ing it by foreign tariffs, we might reasonably expect that the rest of the world would absorb 50 per cent of our output. In view of the fact that registrations have reached one passenger car for every five persons in this country, this factor is increasingly important. The United States has about eight per cent of the world's population. The remaining 92 per cent should be an increasingly large, not decreasing, outlet.

Estimated Effect of Duty on Several American Cars Under New French Tariff

	Weight Lb.	* Former Duty	* Present Duty	Per Cent Increase
Ford	2450	\$282	\$412.18	64 1/3
Chevrolet	2600	304	437.34	64%
Chrysler-66	2800	450	460.01	46

* Estimated.

Former duty may be generally estimated at 45 per cent because deduction for dealers discount was offset by increase in dutiable basis from ocean freight and boxing charge.

Tracy Leaves Oakland; Blees Named Successor

Retiring Official Plans to Take
Extended Vacation

DETROIT, April 14—William R. Tracy, vice-president in charge of sales of the Oakland Motor Car Co., Pontiac, Mich., has announced his resignation after 19 years of service with the company. A. R. Glancy, president of Oakland said Saturday, when the resignation became effective, that he had no announcement to make concerning Mr. Tracy's successor. The retiring official said that he planned to take an extended vacation and that he would continue his home in Bloomfield Hills, Mich.



William R. Tracey

whose resignation as vice-president in charge of sales of the Oakland Motor Car Co. has been announced

Mr. Tracy became associated with the Oakland Motor Car Co. in 1911 as a retail salesman in Detroit. In 1912 he opened the company's Detroit branch, remaining there for three years. He went to Pontiac for two years and in 1917 opened the Cleveland branch. In 1920 he returned to Pontiac as assistant director of sales, and in 1926 he became director of sales. Later he was made vice-president in charge of sales.

Glancy Names Successor

DETROIT, April 16—A. R. Glancy has just announced the appointment of W. A. Blees as vice-president in charge of sales of the Oakland Motor Car Co. to succeed W. R. Tracy, who has resigned. Blees joined Oakland on Jan. 6 this year, as assistant general sales manager in charge of dealer accounting and management. Less than two months later, he became sales manager. Before joining Oakland, he was president of the Motor Accounting Co., a subsidiary of General Motors. Prior to that, for five years, he was associated with the sales and financial departments of the Chevrolet Motor Co.

Chrysler Stockholders Receive Annual Report

Directors Relected At Meeting—
Hutchinson Speaks

DETROIT, April 16—Stockholders of the Chrysler Corp. relected all present directors at their annual meeting at the corporation's Highland Park plant yesterday. Total shares represented in person or by proxy amounted to 74.24 per cent of the shares outstanding and 48.49 per cent of the number of stockholders.

Mr. Chrysler's report to the stockholders, which was read by B. E. Hutchinson, vice-president and treasurer, pointed out that the company is in the best strategic position in its history, to take full advantage of the resumption of business activity on a normal basis now that its products are for the first time competitive in price and value with all other cars. Mr. Chrysler's statement said in part:

"Compared with the average for the past six years retail deliveries of all motor cars in the United States for the best year, 1929, were 21 per cent above the average and for the poorest year, 1927, were 13 per cent below. This indicates a stabilized demand for motor cars and a market which in point of variation from normal would compare favorably with most of the major industries of the country for the same period. The number of passenger cars in use in the United States has in recent years increased at the rate of about five per cent per annum.

"The replacement of worn-out cars each year is an even more important market for new cars. Adding to these the requirements of the export market, there is every indication that the average demand for automobiles during the next five or six years should substantially exceed the average annual volume of production during the past five or six years."

Ford Planes Reduced

DETROIT, April 16—Reductions in prices of all Ford tri-motored planes, effective at once, were announced yesterday by Edsel F. Ford, president of the Ford Motor Co. The 5-AT, powered by three Wasp engines, was reduced from \$55,000 to \$50,000. The 4-AT, with Wright J-6 engines; the 9-AT, with Wasp Junior engines, and the 11-AT, with the newly developed Packard Diesel engines, were cut from \$42,000 to \$40,000. The price of the 7-AT was reduced from \$51,000 to \$47,000.

Muskegon Merger Expected

CHICAGO, April 12—Merger of the Muskegon Motor Specialties Company with a concern engaged in a similar line of business is expected to be announced shortly. The Muskegon Motor Specialties Company's profits for the first quarter of 1930 approximated \$100,000, less than in the first quarter last year but about three times the dividend requirements on the Class A stock for the period.

Vehicle Taxes Increase

WASHINGTON, April 16—Average motor vehicle tax for the entire country was \$28.56 in 1929, as compared with \$25.24 in the previous year, an increase of 13 per cent, according to the American Automobile Association. The tax per vehicle has increased more than 300 per cent in the past 10 years. In 1919 this tax was \$8.55.

Employment in Ohio Behind 1929 First Quarter

COLUMBUS, OHIO—April 16—The Bureau of Business Research of Ohio State University, in a bulletin covering employment in the automobile and automotive parts industry in Ohio, shows that there was a decline of approximately 33 per cent in employment during the first quarter in comparison with the corresponding period in 1929. March employment was 4 per cent greater than in February this year but showed a decline of 36 per cent from March, 1929.

But

In a bulletin issued by the Bureau of Business Research of Ohio State University, employment in the rubber products, including tires and tubes in Ohio during the first quarter of the present year, was 18 per cent less than during the corresponding period in 1929. March employment was 1 per cent less than in February and was 20 per cent less than in March, 1929. Of the 16 reporting concerns, 10 showed increases in March employment over February and 6 showed decreases.

British Sales Decrease

LONDON, April 7—For the second month in succession, the returns for January of new cars registered in Great Britain show a drop, as compared with the figures of 12 months earlier. In December last there was a decrease of 900 to 11,162, while the figure just announced for January this year is 13,683, as against 14,379 for the same month last year. Sedans represented 88 per cent of the total. Reports from nearly all plants indicate a marked diminution of the demand generally experienced in February and March.

Jefferson Plans New Factory

CHICAGO, April 14—The Jefferson Electric Company has formed a new subsidiary in Toronto, Ontario, according to J. A. Bennan, president. A factory to be established there will manufacture a complete line of electrical equipment, including transformers, fuses and specialties.

Toledo Employment Gaining

TOLEDO, April 14—Toledo industry continued to show employment gains during the last week. Net increases of 369 workers in 51 plants, mostly automotive, brought total at work to 27,654, compared with 46,696 at same time a year ago.

Truck Output Retarded at End of First Quarter

Decrease is 29.7 Per Cent,
Compared With 1929

NEW YORK, April 16—Production of heavy-duty motor trucks for the first quarter of this year shows a steady, normal increase over 1928 and 1927, although the figures are somewhat below the abnormal peak reached in the corresponding period last year, as reported by the 10 leading manufacturers in this class at the meeting of commercial vehicle manufacturers at the National Automobile Chamber of Commerce today.

Of the heavy-duty trucks and buses accounted for in the report, an increase of 2.07 per cent was noted over the 1928 production figures for the corresponding period, and an increase of 37.1 per cent over the production during the first quarter of 1927. A decrease of 29.7 per cent is shown in 1930, compared with the production last year.

Tonnage originating on motor trucks now exceeds that carried by railroads, although the greater average haul by rail gives the railroads an annual ton-mileage of over 400,000,000,000, as compared with over 20,000,000,000 by truck, it was announced.

Addresses presented at the meeting were in connection with the Chamber's truck educational campaign now in progress. A. J. Brosseau, truck committee chairman and president of the Mack Trucks, Inc., presided.

Cord Cites Auburn Record

AUBURN, IND., April 16—Setting of a new record high in sales and shipments by Auburn for the first quarter of 1930 is the sequence of a five-year policy of returning to the public the fruits of its success in better automobiles at less commensurate cost, E. L. Cord, president, said today.

"It has been our policy," Cord said, "to predicate our success at the beginning of the year, and to make the savings in increased production, economies of operation, and reduced overhead available to the public at once. This policy works in a cycle. By making greater values available to the public increased demand is effected, which in turn permits of greater economies."

Design Rotary Head

CEDAR FALLS, IOWA, April 14—A rotary head for internal combustion motors has been perfected by F. L. Gushard and J. Lester Smith, employees of the Viking Pump Company of this city, who have spent two years upon their invention.

Stutz Orders Increase

INDIANAPOLIS, April 16—The Stutz Motor Car Co. of America, Inc., now has on hand more unfilled orders than at any time during the past five months, according to an announcement made by Col. E. S. Gorrell, president.

Men of the Industry and What They Are Doing

Bragg and Humphrey Get Bendix Aviation Posts

NEW YORK, April 14—Bendix Aviation Corp., held its annual meeting of stockholders here last week and elected Caleb S. Bragg, president of Bragg-Kliesrath Corp., and A. L. Humphrey, president of Westinghouse Air Brake Co., as directors to succeed C. M. Keyes and J. C. Wilson, resigned.

Vincent Bendix, president, stated that three separate subsidiaries would be formed within the company in the near future, two of which will be in the aviation field and one in the automobile. Further announcement of these internal reorganizations will be made shortly.

All units of the corporation are reported to be in prosperous condition and a general program of expansion is planned. There has been a 20 per cent increase in productive employment in the South Bend plant as compared with a year ago. The new Stromberg plant in South Bend is now nearing completion and machinery is being installed.

Bendix to be Honored

Vincent Bendix, president of the Bendix Aviation Corporation, will be guest of honor at a testimonial banquet to be tendered him at the Stevens Hotel, April 23, by the American Sons and Daughters of Sweden. Wollmar Bostrom, Swedish minister to the United States, will be a speaker at the function. The dinner is to be given in recognition of the distinction recently conferred upon Mr. Bendix when he was decorated at Stockholm by King Gustav as commander of the Royal Order of the North Star. More than 900 are expected to attend the banquet.

Stover is Elected

At the annual meeting of the board of directors of the Sky Specialties Corp., this week, Frank Stover was elected to the board and also was made vice-president to succeed F. L. Riffin. Mr. Stover became connected with the Air Appliance Co. three years ago. This company later entered into the formation of the Heywood Starter Corp., which last June consolidated with the Simon Airplane Appliance Co.

Durant Transfers Leslie

J. H. Leslie, until recently field representative for Durant Motors in Oklahoma, has been transferred to Dallas as district manager for the state of Texas, it is announced by R. T. Hodgkins, general sales manager of the company.

Bitting Leaves Fisher & Co.

Clarence R. Bitting has retired from Fisher & Co. and its affiliated interests, according to an announcement by Fisher & Co., Friday. Charles T. Fisher was reported as being disinclined to add to the formal statement.

Assists Erskine



K. B. Elliott

Whose appointment as assistant to the president of the Studebaker Corp. has been announced

Packard Names E. Macauley

Edward Macauley has been appointed sales manager of the aircraft and marine engine division of the Packard Motor Car Co. and will be in charge of sales of the new Packard-Diesel aircraft engine, according to an announcement by H. W. Peters, vice-president of distribution of the Packard company. Mr. Macauley formerly was a sales manager of the Detroit retail branch of the Packard company and later was promoted to the post of assistant to the vice-president of distribution. Mr. Macauley has announced that for a time at least sales of both aircraft and marine engines will be handled directly between the Packard company and the trade. This plan is expected to hold until some further distributing program has been worked out.

Allen Joins Autocar

R. C. Allen, until recently manager of the LaFrance-Republic Sales Corp. branch at Newark, N. J., has been appointed to the national user division of the sales organization of the Autocar Co., with headquarters at the Autocar Branch in New York City.

Olin Gets Pilot's License

R. E. Olin, secretary and treasurer of the Kinner Airplane & Motor Corp., recently took the examination and received his private pilot's license.

Erskine Names Elliott as His New Assistant

The appointment of K. B. Elliott, as assistant to the president of the Studebaker Corp., has been announced by A. R. Erskine, president. Mr. Elliott, who had been assistant comptroller of the corporation since last June, succeeds J. L. Overlock, whose appointment as vice-president and treasurer of Grigsby-Grunow Co., radio manufacturers, was recently announced.

Mr. Elliott came to Studebaker in August, 1928, and in October of the same year was elected assistant treasurer. In June, 1929, he was named assistant comptroller, which position he held until the present. He was graduated from Drury College, Springfield, Mo., and later took special graduate work at Columbia University and at Northwestern University School of Commerce.

Gar Wood Appoints Teagan

J. Howard Teagan has been appointed sales manager for Gar Wood, Inc., which organization is this year turning out fourteen different speedboat models from its new plant at Marysville, Mich. Mr. Teagan served with the Hupp Motor Car Co. for 16 years, two and a half years as assistant sales manager and 14 as export manager. Following this he had years of service with the Chrysler Corp. in charge of export of marine motors and Fargo trucks.

South America Claims Ferguson

H. D. Ferguson, for the past year connected with the export department of the White Co., has left for Chile, where he will represent that company in sales work on the west coast of the country. He will have his headquarters in Santiago. He expects to remain there from two to three years and was accompanied to his new post by Mrs. Ferguson and their three children.

Uppercu is on Cruise

Inglis M. Uppercu, president of the Uppercu-Cadillac Co., New York distributor for Cadillac and LaSalle cars, sailed last week on his ship, the Seven Seas, for a two weeks' cruise to Porto Rico. Mr. Uppercu purchased this boat about a year ago from the Swedish Government, and has reconditioned and equipped it with engines of 360 hp.

Clapp Joins Wayne Co.

Kenneth S. Clapp has resigned as director of sales of the United States Air Compressor Co., and has affiliated himself with the Wayne Co., Fort Wayne, Ind. He has also incorporated the Clapp Patent Corp., Cleveland, which controls patents on grease dispensing apparatus. It will be Mr. Clapp's second affiliation with the Wayne organization.

New Cars Financed in February Totaled 192,093

WASHINGTON, D. C., April 14—The number of automobiles financed during February, as reported to the Department of Commerce by 423 automobile-financing organizations, was 192,093, on which \$82,616,375 was advanced as compared with 162,317 on which \$72,062,419 was advanced in January and 204,095 on which \$87,884,269 was advanced a year ago. Wholesale financing during February was \$61,330,128 as compared with \$53,268,191 in January and \$47,988,811 a year ago.

This summary will be subject to revision in subsequent issues as reports are received from additional concerns. Detailed statistics are given below, by months, new cars and used cars shown separately. Some of the smaller firms found it impossible to segregate their operations; their totals are shown in the unclassified group.

Summary of Automobile Financing

1929	Wholesale Financing Volume in Dollars	Retail Financing							
		Total		New Cars Financed		Used Cars Financed		Unclassified	
		Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars
January	\$36,614,956	152,226	\$74,278,753	77,684	\$48,156,587	67,603	\$23,090,482	6,939	\$3,031,684
February	47,988,811	204,095	87,884,269	103,271	61,478,686	92,974	23,066,587	7,850	3,338,996
Total 2 mos.	\$84,603,767	356,321	\$162,163,022	180,955	\$109,635,273	160,577	\$46,157,069	14,789	\$6,370,680
March	.....	301,700	141,408,566	167,740	98,566,374	121,234	37,635,306	12,726	5,206,886
April	.....	375,662	173,991,504	206,267	121,517,771	154,037	46,213,460	15,358	6,260,273
May	.....	393,881	181,077,726	213,138	125,393,213	166,010	49,824,789	14,733	5,859,724
June	.....	380,989	176,409,673	204,871	122,324,819	163,228	48,872,473	12,890	5,212,381
July	.....	380,874	176,578,230	207,424	123,256,076	159,782	47,885,243	13,668	5,436,911
August	.....	347,160	160,796,697	186,303	110,197,198	147,976	44,919,792	12,881	5,679,707
September	.....	293,251	136,024,669	155,783	92,754,546	125,282	38,396,264	12,186	4,873,859
October	.....	270,299	124,064,340	129,167	78,953,869	129,325	40,589,879	11,807	4,520,592
November	.....	207,031	92,402,996	95,130	57,454,498	102,941	31,467,351	8,960	3,481,147
December	.....	171,205	78,410,747	73,657	46,127,507	91,593	29,648,715	5,955	2,634,525
Total (year)	.....	3,478,373	\$1,603,328,170	1,820,435	\$1,086,181,144	1,521,985	\$461,610,341	135,953	\$55,536,685
1930									
January	\$53,268,191	162,317	\$72,062,419	76,658	\$44,394,323	80,762	\$25,581,487	4,897	\$2,086,609
February	61,330,128	192,093	82,616,375	93,012	51,740,873	93,092	28,428,156	5,989	2,447,346
Total 2 mos.	\$114,598,319	354,410	\$154,678,794	169,670	\$96,135,196	173,854	\$54,009,643	10,886	\$4,533,955

Diamond-T Adds Model

CHICAGO, April 14—The Diamond-T Motor Car Company has announced the addition of a new high speed, six-wheel truck of six tons rated capacity. The new model 1200 round out a complete line of 6-cylinder, six-wheel trucks to handle loads of from 4 to 12 tons. The Diamond-T Hercules heavy duty, 6-cylinder motor has a 4½-in. bore and a 4¾-in. stroke. It is rated at 48.6 hp. N.A.C.C., but actually develops more than 99 hp. at 2200 r.p.m. Construction details include the heavy 3-in. crankshaft in seven main bearings, pressure lubrication, cast iron pistons, built-in filtrator and a high velocity water pump with directed flow to the exhaust valve jacketing.

Hudson Earnings Estimated

DETROIT, April 14—Hudson Motor Car Company earnings for the first quarter, it is officially estimated, will exceed the dividend requirements of \$1.25 a share. Shipments in this period have reflected the company's program of keying its production with retail sales.

Columbia Axle Output Gains

CHICAGO, April 15—March production of the Columbia Axle Company, a subsidiary of the Cord Corporation, was 6800 units as compared with 5546 in February. No comparison is available

for the same month of last year. February production was an increase of 21 per cent over that of January. March export shipments of the Cord front drive cars was 11 per cent higher than for any preceding month since the car was announced.

Samuel B. Lambert

MOLINE, ILL., April 12—Samuel B. Lambert, aged 36 years, president of the Lambert Aircraft Engine Corp., subsidiary of Allied Aviation Industries, Inc., St. Louis, was instantly killed at Schockley field, South Bend, Ind., the afternoon of April 7, when his monocoque fell 2000 ft.

Mr. Lambert was a member of a pioneer St. Louis family, and his cousin, Albert Bond Lambert, for whom Lambert field, St. Louis, is named, started his interest in aviation. The younger Lambert organized the Lambert-Graves Motor Corp. in St. Louis three years ago, became associated with Allied Aviation Industries and the Lambert Engine Corp., a subsidiary, was organized.

Houdaille Reelects Directors

CHICAGO, April 14—Directors of the Houdaille-Hershey Company were reelected at the annual meeting last week. There were present at the meeting, in person or by proxy, 377,260 shares of class B stock out of a total of 514,136 shares.

Air Accidents Decrease

WASHINGTON, April 14—An increase in the number of miles flown for each accident in civil aeronautics in the United States for the last six months of 1929 over the same period in the previous year is shown in the semi-annual report of aircraft accidents made public today by Clarence M. Young, assistant secretary of commerce for aeronautics.

In scheduled air transport operations for the last half of 1929, the report shows there were 15,940,161 miles flown, and as there were 15 fatal accidents, the mileage flown for each fatal accident was therefore 1,062,677. In 1928 for the same period, there were 6,188,838 miles flown and 7 fatal accidents, which placed the miles per fatal accident at 884,120.

Adopts Herzmark Starter

LONDON, April 9—The Air Ministry, after lengthy tests of the Herzmark compressed air starter, has placed a substantial order for equipments to be fitted to Diesel engines designed by the Ministry for airplanes and airships. Monsieur Herzmark is also supplying the British Air Ministry with a two-stage 4-cylinder compressor, weighing about 2 lb. only and giving a pressure of 1000 lb. per sq. in., for use in connection with the operation of auxiliaries on airplanes by compressed air.

Canadian Exports Gain, But Lag Far Behind 1929

Average Value of Cars Shipped
Declined in February

WASHINGTON, April 17—Canadian exports of passenger cars and trucks reached a total valuation of \$1,734,840 in February, 1930, 23.6 per cent above the value of exports in January of the same year, although still 62 per cent below exports in February of 1929. February exports of total units were 89 per cent higher than in the previous month but 67 per cent lower than in February of 1929.

Passenger car and truck shipments registered increases of 89 and 6 per cent respectively as compared with January figures. The greater portion of passenger car exports were in the classification "Valued up to \$500" which constituted 74 per cent of the total.

After being adjusted for seasonal variation, February production was still 59 per cent below the normal as indicated by the long term trend observed during the five-year period 1925-1929. Production figures for February showed gains over January totals for all types except chassis, which registered a decrease of 13 per cent. Over 72 per cent of the chassis manufactured were freight units.

Passenger car output increased 78 per cent over January, 1930, open cars advanced to 2243 from 594 and closed models to 10,021 from 6255 units. The production of trucks showed a gain of 47 per cent as compared with the previous month. Of the trucks manufactured 321 were under one-ton capacity, 82 one ton and the rest over one and under five tons. The average export valuation of passenger cars was \$434 in February as compared with \$539 in January.

Morris Motors Net Drops

LONDON, April 3—Morris Motors, Limited, report that the net profit on trading and interest received for 1929 amounted to £1,285,181 after providing for depreciation and contingencies. This compares with £1,314,089 for 1928, but it is pointed out that the 1929 figure is arrived at after providing £25,123 to reduce the government securities to market value at December 31, last. Today the market value of these securities is £79,691 in excess of the balance sheet valuation of £2,330,892. The directors consider that the results are satisfactory, especially as the company has introduced two new six-cylinder models, in respect of which all the preliminary costs have been provided out of revenue.

Potez to Build in Canada

QUEBEC CITY, QUE., April 15—Henry Potez of Canada, Limited, a branch of Henry Potez, aeroplane manufacturers of Paris, France, have chosen Cap de la Madeleine, P. Q., as the site of their factory. They will renovate a foundry building which they recently purchased there and will also build a large hangar.

Olds Gets Large Single Order

DETROIT, April 14—The New York zone office of the Olds Motor Works has announced the receipt of a single retail order for 102 Oldsmobiles, involving a purchase price of over \$100,000, from the Hertz Drivurself Stations, Inc., New York City. It is believed to be one of the largest single retail automobile transactions in the history of the automobile business.

Surveys City Paving

NEW YORK, April 14—The Asphalt Institute has conducted a survey of 88 cities having a population of 100,000 or more, which showed that in 1929 there was constructed approximately 45,000,000 sq. yds., or about 4400 miles, of new city pavements of a higher type than waterbound macadam, an increase of about 11 per cent over 1927 and 1928. Returns of this survey also show that there is in prospect for 1930 a program of expanded city street construction, in accordance with President Hoover's plan to make prosperity permanent. City paving in the larger cities, according to indications, will be from 15 to 20 per cent greater in 1930 than in 1929.

Shipments Estimated for Second Quarter

WASHINGTON, April 14—Shipments of automobiles, trucks and parts during the second quarter of the current year will require 248,194 cars, or 17.4 per cent less than the 300,462 cars required during the corresponding period of 1929, according to estimates made by the 13 Shippers' Regional Advisory Boards. The reports are the regular quarterly estimates made by the boards for the Car Service Division, American Railway Association, and in all cover 29 principal commodities.

Body Production Increased

EVANSVILLE, IND., April 14—The local factory of the Graham-Paige Body Corp. is operating on a production schedule which by May 1 will have reached capacity schedule, according to R. E. Stone, secretary. This goal will average 250 bodies a day, and require 1200 employees. At present the factory is employing 1000 people on 58-hours per week program, and averaging 200 bodies a day. The plant is now equipped with four body framing machines, and will soon install electric butt welding equipment, Mr. Stone stated.

Demonstrates Plane in Japan

DETROIT, April 15—A 6 months' demonstration tour of Japan and China by a Ford all-metal transport plane was successfully inaugurated during the last week-end at Tokyo, according to a cablegram received today by William B. Mayo, chief engineer of the Ford Motor Company, from Perry G. Hutton, pilot of the plane.

International Groups Plan Aerial Safety Congress

Aeronautics Branch Appointed
American Correspondent

WASHINGTON, April 17—The Aeronautics Branch of the Department of Commerce has accepted an invitation to serve as correspondent in the United States for the organization committee of the First International Aerial Safety Congress to be held in Paris from Dec. 10 to 23, under the patronage of the French Ministry for Air and the auspices of the French Committee on Aeronautical Propaganda, it was announced today by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

"The Congress, declared to be the first step along the line of an internationalization of researches dealing with aerial safety," Mr. Young said, "has for its object the study, in common, of (1) all scientific and technical investigations dealing with aerial safety; (2) all questions pertaining to the application of safety to all branches of aerial activity; (3) all questions of documentation and statistics, for the purpose of making known through the daily press the increased safety in flying; (4) in a general way, all questions dealing with aerial safety and the means by which to hasten its progress.

"The Congress will be made up especially of (1) meetings to consider problems of aerial safety, which will be divided into seven groups and six sections; of (2) practical demonstrations reserved for French and foreign builders and inventors desiring to present their findings to the conference; (3) a visit to the Paris Aeronautics Exhibition, which has been scheduled to open Nov. 28 and close Dec. 14; (4) inspection of French aviation plants, French laboratories, airdromes and commercial aviation companies; and (5) various receptions and visits to French industrial centers."

Shifts Truck Output

LONDON, April 14—Up to the present Chevrolet passenger cars and commercial vehicles for Great Britain have been assembled at the Hendon plant of the General Motors Corp., but now the commercial vehicles are being built from British materials at the Vauxhall factory at Luton, which is controlled by General Motors. It is stated that this will not interfere with the production of Vauxhall cars, which is being increased, new buildings being erected for the manufacture of the parts for the Chevrolet commercial vehicles. The amount of capital invested at Luton now exceeds £1,000,000 (about \$5,000,000) and about 2000 work people are employed. At the start the British labor and material employed for the chassis represent about 70 per cent of the total cost, and this will be increased to 75 per cent if any kind of body is fitted.

Australia's Tight Credit Explained by Randolph

General Motors Official Cites
Adverse Trade Conditions

NEW YORK, April 14—Because of adverse trade conditions, Australia has been suffering for the past several months from an unfavorable balance of trade which has resulted in the weakening of her foreign credit situation to the point where she has placed a virtual embargo upon the shipping out of any money, Innes Randolph, former regional manager of General Motors Australia, Pty., Ltd., told members of the Overseas Automobile Club at the regular monthly meeting last Thursday.

It is because of this fact that it is virtually impossible for exporters here sending goods to Australia to get their money returned to this country at the present time. In an effort to combat the situation by cutting down on the imports and encouraging domestic labor as much as possible, the Australian labor government has just put into effect an advanced tariff schedule which amounts virtually to prohibition of imports of finished automobiles.

The only items in the automotive field on which the tariff has not been raised are unassembled chassis. By permitting the continued import of these the government has felt that domestic labor would be assured and the assembling of cars and the building of such parts as Australia is equipped to manufacture will be continued. The new tariff became effective April 3 but goods shipped on April 4 were exempted from the new provisions.

J. O. Arnold

PHILADELPHIA, April 16—British engineering papers record the death of J. O. Arnold, formerly professor of metallurgy at the University of Sheffield. Professor Arnold was a pioneer in work connected with the use of vanadium for alloying steel, which work led to the introduction of vanadium steel as a material of construction for automobiles and for other purposes. Later he succeeded in producing a high-speed tool steel by substituting molybdenum for tungsten. Professor Arnold was 72 years of age.

Increases Tractor Output

MINNEAPOLIS, April 14—Shipments of tractors by the Minneapolis-Moline Power Implement Co. were 75 per cent higher than in March, 1929, says President W. C. MacFarlane. All the three plants are running full time and make an output that is increasing. Tractors are the principal product of the Minneapolis plant and the output has reached 36 a day.

du Pont Division Gains

NEW YORK, April 16—The Chemical Specialties Division of the du Pont Company reports that business in March was 42 per cent greater than in March of last year.

Crosley Making Car Radios
CINCINNATI, April 15—Production on a large scale of automobile radios, by the Crosley Radio Corp., is forecast in an announcement by Powel Crosley, Jr., president of the corporation. It is expected that "Roamio" receivers, manufactured by the corporation, will constitute a large part of its business during the remainder of the year, according to the announcement.

Advertising in Newspapers Cost \$80,000,000

NEW YORK, April 14—Out of a total expenditure of \$260,000,000, estimated by the Bureau of Advertising of American Newspaper Publishers' Association as the amount spent by national advertisers in newspapers in 1929, the automotive industries led all industrial classifications with estimated expenditures of \$80,710,000, according to an article in *Editor and Publisher*. Of this amount \$64,245,000 was accounted for by 23 automobile and truck companies; \$750,000 by 5 accessory manufacturers, \$10,415,000 by 28 gasoline and oil companies, and \$5,300,000 by 11 tire companies.

And

Of automotive advertising the bureau report says:

"The only subdivision in automotive advertising which shows an advertising decrease during the year is the classification which deals with passenger cars. The falling off in lineage, and the drop in sales of passenger cars was noted several months before the break came in stock market prices." Eleven makers of passenger cars are listed, however, as having increased their advertising appropriations in 1929, as compared with 1928.

The figures gathered by the bureau are based on actual expenditures of more than \$50,000 each by 535 national advertisers, to which have been added a number of detailed reports from smaller concerns spending less than \$50,000 in the year.

Goodyear Plant Stepped Up

BIRMINGHAM, April 14—The Goodyear Tire & Rubber Co. tire plant at Gadsden, Ala., which has been operating on a five-day schedule for some time, was recently placed on a six-day basis. Instead of 5000 tires per day, as has been the output, the mill is turning out 5500 daily, its maximum capacity. Machinery will be added to produce 8000 tires daily when business warrants it, Gadsden officials announce.

Soviet to Increase Tractor Output

NEW YORK, April 14—The Supreme Economic Council in the U. S. S. R. has decided to increase the tractor production of Putilov to 12,000 units for the current fiscal year. Of this production, 10,800 will be complete tractors and the rest the equivalent in spare parts.

Business in Brief

Written by the Guaranty Trust
Co., New York, exclusively for
AUTOMOTIVE INDUSTRIES.

NEW YORK, April 16—Wholesale and retail trade were stimulated last week by the warmer weather and the approach of Easter. The most outstanding improvement was noted in the sales of shoes and clothing. General industry also showed some increase in activity.

DEPARTMENT STORE SALES

Sales of 532 department stores located in leading cities during March, according to a preliminary report of the Federal Reserve System, were 12 per cent below those in the corresponding month last year. Sales during the first quarter of the year were six per cent below those a year ago.

CHAIN STORE SALES

Sales of 23 store chains during March amounted to \$110,898,400, which marks a decrease of 9.67 per cent below those a year ago. Sales of these same store chains during the first quarter of the year were .19 per cent above those a year ago.

COTTON CLOTH OUTPUT

Production of standard cotton cloth during March, according to the Association of Cotton Textile Merchants of New York, amounted to 261,403,000 yards, which was 11.8 per cent below sales and 1.6 per cent below shipments.

CRUDE OIL PRODUCTION

Average daily crude oil production for the week ended April 5 amounted to 2,530,450 bbl., as compared with 2,514,200 bbl. for the preceding week and 2,658,100 bbl. a year ago.

FREIGHT CAR LOADINGS

Railway freight loadings for the week ended March 29 totaled 885,159 cars, which marks a decline of 84,037 cars below those a year ago and a decline of 63,584 cars below those two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended April 12 stood at 91.3, as against 90.8 the week before and 90.1 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended April 9 were 5 per cent below those in the corresponding period last year.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended April 9 showed decreases of \$15,000,000 in holdings of discounted bills, of \$34,300,000 in holdings of bills bought in the open market, of \$3,100,000 in holdings of government securities, and of \$30,700,000 in member bank reserve deposits. The reserve ratio on April 9 was 81.5 per cent, as against 79.8 per cent a week earlier and 81.8 per cent two weeks earlier.

Road Machinery Builders Plan International Exhibit

October Date Set in Conjunction
With Convention

WASHINGTON, April 19—Delegates from 56 countries will have an opportunity to study the best products of American highway machinery manufacturers at an international road exhibition to be held in Washington, Oct. 7-10. The exhibition will be held by the American Road Builders' Association simultaneously with the sixth international road congress.

Inasmuch as the United States produces for domestic use and export more road building machinery and equipment than any other nation, foreign delegations will welcome this opportunity to learn what is new in the industry. The congress program will give much space to the progressive ideas and methods of American engineers.

The exposition will be held in Washington Auditorium. Outdoor space nearby will also be used for exhibits and a demonstration of road building machines under working conditions will be staged. In addition to an estimated 400 American manufacturers who will have equipment in the exhibit, the manufacturers from all other countries are urged to send exhibits, so that both the exposition and the congress may be truly representative.

Thompson to Produce "Twincycle"

CLEVELAND, April 14—Thompson Products, Inc., is preparing to enter large production on its new Twincycle shock absorber after an extensive trial period during which time the product has been tested by many manufacturers. It is planned at first to build the absorber for cars in the light weight, popular price field. The company will make its first shipment shortly to a low price, large volume builder.

Byrd Flight Pictures to be Shown

NEW YORK, April 14—Pictures taken on Commander Richard E. Byrd's flight over the South Pole will be shown to the public for the first time at the New York air show, May 3 to 10.

Feature Issues of Chilton Class Journal Publications

Automobile Trade Journal and Motor Age, "Make Money from Maintenance Issue," May, 1930.

Ready May 1

Chilton Automotive Multi-Guide, First Semi-annual Issue.

Ready in May

La France-Republic Offers New Six Truck

ALMA, MICH., April 14—The La France-Republic Corp., is offering a new six having a straight rating capacity of from 12,000 to 13,000 lb. equipped with a four-speed transmission and four-wheel hydraulic brakes. This new unit is designated according to its wheelbase length, of which there are three: Model F-2 has a wheelbase of 174 in.; Model FA-2, 198 in., and Model FB-2, 146 in. All three have a common low frame height, when loaded, of 30½ in.

Model F-2, incorporates many new improvements in mechanical construction, as well as in design and appearance. Notable among these are a six-cylinder, 3½ x 5-in., L-head Lycoming engine developing 80 hp. at 2500 r.p.m.; Fuller, unit mounted, ball-bearing equipped four-speed transmission; Timken full-floating, bevel drive rear axle giving a final reduction of 6 1/6 to 1; four-wheel, internal, Lockheed hydraulic brakes with vacuum booster; Tru-Stop emergency brake; high, narrow tubular radiator; an 8 in. frame and floating contact type rear springs.

Durant Shipments Gain

DETROIT, April 14—March witnessed a gain of 37 per cent over February in shipments of Durant cars and trucks into the 42 states supplied by the factories at Lansing and the March output of the Canadian Durant plant at Leaside, a suburb of Toronto, exceeded that of February by 45 per cent.

International Garagemen Elect Dorntge President

Garage Accounting and Urban Problems Occupy Convention

LOUISVILLE, April 14—The International Garage Association at its closing session in Louisville, last Saturday, reelected all officers and decided to hold its next meeting in Detroit, in October. M. E. Dorntge, Buffalo, is president; Stanford Warrington, Toronto, vice-president; I. W. Steele, Rochester, N. Y., treasurer. The board of managers is composed of W. T. Candler, Atlanta; J. D. Corbiere, Boston; A. A. Kerr, Cleveland; O. W. Cooke, Newark, and Austen Gailey, New York.

Officers and directors were elected to serve a term of 18 months under amended by-laws, after it had been determined to hold conventions annually, instead of semiannually, thus balancing election dates with convention dates.

W. K. Kommers, secretary-treasurer, City Ramp Garage, Spokane, read a paper on downtown garage operations at the Friday session, and W. T. Candler, Atlanta, discussed Garage Accounting. Clarence L. Madden, Cleveland, spoke on Public Relations.

AC Engineers Shift Quarters

DETROIT, April 14—The engineering department of the AC Spark Plug Co. is now in the process of moving into its new headquarters, the engineering building, having 73,000 sq. ft. of floor space. It is a three-story building. On the first floor are the maintenance and stores departments and the clay preparation department. On the second floor are located the experimental machine shop, testing rooms and the ceramic laboratory. Offices, drafting rooms, experimental spark plug development department and chemical and physical laboratories are located on the top floor.

Hayes, Ltd., Earnings Drop

CHATHAM, ONT., April 14—Hayes Wheels and Forgings, Limited, showed earnings from operations for the year ended Dec. 31, 1929, of \$457,211, as compared with \$460,381 in 1928.

Calendar of Coming Events

SHOWS

Berlin, International Automobile...Nov. 6-16

CONVENTIONS

National Council Meeting of the U. S. Chamber of Commerce, Washington...April 28
U. S. Chamber of Commerce Annual Meeting, Washington...April 28-May 1
American Gear Manufacturers Association, Annual Meeting, Cincinnati...May 1-3
Associated Business Papers—Spring Meeting, White Sulphur Springs, Va...May 5-6-7
National Association of Credit Men, Annual Convention, Dallas...May 12-16
National Aeronautic Meeting (Auspices A.S.M.E.), Dayton, Ohio...May 19-22
National Foreign Trade Conference, Los Angeles...May 21-23
Society of Automotive Engineers, Summer Meeting, French Lick Springs...May 25-29

Automotive Engine Rebuilders' Association, Convention, Chicago...May 26-28
National Conference on Street and Highway Safety, Washington...May 27-29
National Automobile Chamber of Commerce, Annual Meeting, New York...June 5
A. S. M. E., Semi-Annual Meeting, Detroit...June 9-12
A. S. M. E., Oil, Power & Gas Div. State College, Pa...June 12-14
World Power Conference, Berlin...June 16-25
Railway Supply Mfrs. Assn., Meeting and Exhibit, Atlantic City...June 18-25
American Railway Association, San Francisco...June 23-26
American Society for Testing Materials, Annual Meeting, Atlantic City...June 23-27
Steel Founders Soc. (Midsummer Convention) White Sulphur Springs...June 26-28

Eastern States Exposition, Springfield, Mass...Sept. 14-20
National Safety Council, Annual Safety Congress, Pittsburgh...Sept. 29-Oct. 4
Sixth International Road Congress, Washington, D. C...Oct. 6-11
Exhibition—American Roadbuilders Association, Washington, D. C...Oct. 6-11
Motor and Equipment Association, Convention, Cleveland...Nov. 10-14

SALONS

Chicago, Drake Hotel...Nov. 8-15
New York, Commodore Hotel...Nov. 30-Dec. 6

RACES

Indianapolis...May 30
Belgium...July 5-6
Germany (Grand Prix)...July 13
Belgium (European Grand Prix)...July 20
Spain...July 27
Italy (Grand Prix)...Sept. 7
France (Grand Prix)...Sept. 21